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Dyeing and Finishing Rayon Upholstery for Automobiles

By **FRED. GROVE-PALMER, A.I.C.**

UPHOLSTERY cloths in which rayon is the predominating fiber have long been a marked feature in the home-furnishing market; a more recent application of similar fabrics is found in the trimming of the interiors of the highest grades of automobiles.

A large variety of these beautiful materials is coming forward in which the rayon is blended with cotton, linen, hemp, jute, ramie and mixtures of these, while for the purposes of curtains and similar embellishments there are taffetas composed of a schappe silk warp with rayon filling.

The cloths intended for the cushions, seat backs and sides, may belong to the class of repps of which there is very extensive range, or they may choose from among the almost endless array of very elaborate brocades and jacquard fabrics that are being issued from the mills. Many of these latter have also a spun silk warp with the rayon as filling though, more generally, the warp is either a single or doubled cotton yarn. Some of the more enterprising manufacturers are using the stronger vegetable fibers, such as flax, hemp, the finer qualities of jute and, in the case of some of the French cloths, ramie is being employed.

Woolen yarns are rarely used in auto upholstery fabrics; when they do appear they figure in some of the repp cloths, more especially the "Marly" repps which, although of great richness of texture, are distinctly sedate in appearance, in opposition to the gorgeousness of the brocades.

Rayon, without any admixture of other fiber, is also a very valuable addition to the long list of fabrics that are being made for this purpose.

It has been suggested that these materials may be too slippery in the surface for them to be serviceable in autos, but any tendency in this direction is checked in the jacquard designs where the raised figure prevents any sliding. In discussing the point with the manufacturers, however, it was found that no complaints had been encountered under this heading. Another suggestion was that the rayon would, in the course of a little wear, fluff up and look unsightly, but this, again, is a bogey that need call up no fears. Very extensive tests have been made on the durability of rayon and it has been proved that it actually wears better than cotton under similar conditions.

Upholstery velvets and plushes for furnishings have had an established market for a considerable time; this is now being extended to the auto trimming industry with very gratifying results. The justifiable complaint that rayon tends to "plush" very readily, owing to the lack of elasticity of the fiber has been met by mixing in such fibers as Akon, or a modified Kapok, which are vegetable silks so treated as to render them spinable.

Rayon staple fibers are also mixed with cotton for the making of carpets and other pile fabrics for autos.

Of the total quantity of rayon produced, it is safe to say that 20 per cent is used for the manufacture of upholstery decorative fabrics but the proportion of that which finds its way into the interior of autos is, as yet, not shown separately in statistics. At the same time, it must be said that the demand is increasing; at various automobile shows, fairs and expositions during the past year the rayon upholstered cars showed a very decided increase in numbers. At present it is largely the desire of the wealthy, but it will not be a great while before the beauty of these fabrics will cause them to be called for in autos of less expensive makes.

Dyeing

When considering the coloration of ordinary cloths the dyer has to be sure that his work will be fast to light, washing, perspiration, milling, heating and rubbing. The dyer who is concerned with the finishing of auto coverings has a simpler task because the fastness demands he is up against are limited to the first and last of these. The other adverse influences that affect the colors of apparel are not matters that interfere with the permanence of the shade in the auto body. There the covers may require renovation but that would be done by one of the methods of dry-cleaning that does not affect the dyes.

With modern dyestuffs it is not difficult to choose those which will give excellent fastness to light, while fastness to rubbing is largely a matter of care in the application and subsequent washing out of the coloring matter.

It is a remarkable fact that there are still a number of folk who think that rayon cannot be dyed fast to light; they are still thinking of those early days when failures outnumbered successes, but if they were merely to glance at the windows of the stores in their own home towns and see the piles of rayon goods offered there for purposes that demand a very high standard of fastness to practically all influences, their fears on this head would be speedily removed. There is little difficulty, to-day, in getting colors as fast on rayon as they are on cotton or fiber flax.

Naturally, there must be some limit set to what "fastness" really means; the dye that will forever withstand every possible adverse influence has yet to be invented, so has the metal, but the scientists have gone a good way along both roads. The vat dyes will give all the satisfaction that the most punctilious person can desire, even though the boast that the dye will hold the fabric together long after the fiber has decayed may not be more than a hopeful bluff. There is a large variety of makes of vat dyes and they are all good. Then there are the diazotized and developed colors in many long ranges, which are also exceedingly useful in resisting fading. The substantative dyes, too, have no little merit in this respect and, if chosen carefully with full understanding of their use for this particular purpose, there are many to choose from—a fact well known to the biggest producers of these cloths.

The make of the fabric will determine whether the dyeing is to be in the hank or the piece. Two-fiber plain woven materials in solid or cross-dyed shades present few difficulties when the yarns used are of such different fibers as silk and viscose, as for instance, in taffetas for curtains.

Two Color Work

For two-color work harmony should be the aim and it is well to remember that the effect produced by mingled threads of different shades are not at all like those produced by the same colors when shown in stripes and bars; the designer often needs to revise his ideas when he compares contrasting colors mingled together with the same shades separately grouped.

The gray cloth as it comes from the loom should be degummed and scoured in order to remove the sericin from the silk and the sizing that has been put on the warp threads and on the viscose to help the passage through the heddles. Great care is needed in handling during this operation as otherwise the spun silk may be fluffed and the viscose damaged by rough treatment; this leads to the production of what is often called "lousiness," a description that is more forcible than accurate. It cannot be seen until the silk-rayon cloth is on the inspection perch; then it will require a special after-treatment to effect a cure. It is not unusual to find that this after-treatment is a part of the regular routine in mills that suffer badly from the defect.

Whatever may be the sizing or lubricant used on the fibers, the nature should be such that removal is easy so that the cloth shall not undergo a prolonged processing. When the yarns are brought in from outside ready for weaving, it should always be an essential part of the contract that the dyer should know exactly what has been put on them for slick working.

A good normal scouring process is working the goods, either piece or skein, for three-quarters of an hour at 75 deg. C. in a liquor made up as follows:

Marseilles soap	10 lbs.
Ammonia	10 pints
Soft water	120 gallons

It occasionally happens that the schappe silk has more than its usual quantity of gum left in it and, therefore, requires rather a higher temperature for boiling-off; this should be kept to the minimum both as regards time and heat, and should be avoided when possible. The first wash from the scouring bath is in water that is somewhat cooler than the bath itself; this is to prevent any alteration in the threads arising from the sudden change into cold water for the complete wash. It is a precaution that is often omitted as being useless but, believing in its efficacy, one is inclined to persevere with it.

Cross-dyeing is really easier in the two-bath process than the one-bath, but this does not necessarily apply to the production of solid colors.

Rayon-Cotton Upholstery Fabric.

In the latter case, those dyes which will go on woolen yarns in a neutral bath will be found generally successful, and there are, in addition, quite a good few substantive dyestuffs that will dye the silk. The process for the neutral wool dyes is working the batch for as little time as may be possible in the color solution at about 95 deg. An addition of from 10 to 40 per cent of Glauber's salt is sometimes required, but not always. Dark colors can be

produced by entering at 75 deg. and slowly raising the temperature in a rather shorter bath, say, 25 to one. In either case the time of working will be from 30 to 45 minutes. Any inclination to paleness on the part of the silk can be corrected by refreshing the dyebath with more color and a dash of formic acid, working it in this for another fifteen minutes with the steam shut off. The following dyes will be found good for the purpose:

Azo Yellow ASW	Coomassie Navy GNX
Wool Orange A conc.	Disulphine Green B
Croceine Scarlet MOO	Naphthaline Black 12B
Wool Violet 4BN	Union Fast Yellow G
Brilliant Wool Blue N	Union Orange R
Fast Acid Green B	Universal Scarlet C
Erie Fast Brown GR	Union Violet KRN
Durol Black 2B	Union Navy KO
Citronine Yellow conc.	Union Green VT
Acid Orange 1V	Union Dark Brown TD
Milling Scarlet 5B	Universal Jet Black C
Fast Acid Violet 2R	

There are also numbers of other good colors under this same category.

Precautions

Although the process of dyeing with these coloring matters follows the general lines of ordinary practice there are one or two precautions that should be taken in order to achieve success. The instructions issued by the manufacturers should be followed when the dyer is testing out a new make. Furthermore, if the work is to be done in a wooden kettle that has previously been used for acid colors it is necessary to give it a good boiling out with water containing sufficient soda completely to neutralize all the acid that has been absorbed by the wood. If lined backs are used, or those made of monel metal, a simple wash down with hot water is all that is wanted. When full shades are being dyed it is a matter of dyehouse economy to keep standing baths, refreshing them with from one-half to three-quarters of the original quantities for each subsequent batch of goods. Pale colors should not immediately follow dark blues, browns or blacks in a wooden vat, otherwise there will be some degradation of shade arising from the dyestuff that has sunken into the wood.

Reverting for a moment to the matter of standing baths, it is sometimes found that if the extra addition of Glauber's salt is on the lines already mentioned, the bath does not respond in quite the right way; some dyers of long experience find it more expedient to put from 2 to 3 pounds of Glauber's into each 12 gallons of water they require to bring the liquor up to full bulk. Blacks, navy blues, browns and the various deeper wine shades should always get an extra warm wash; if this is not done there is sometimes a tendency to bronziness. When goods dyed in these colors are passing over the stenter it is advisable to lower the heat as much as is practically possible, with the same object in view. A little acetic or formic acid is desirable in the final wash water, not only to brighten the color but to prevent any change in shade during the drying process.

In the course of dyeing, the addition of the acid should never be made until the dyer is sure that his cotton is right on shade.

Some of the substantive dyes will give excellent effects in a weakly acid bath though it should be remembered that many of them are absorbed more quickly by the schappe silk, under these conditions, than by the rayon, and therefore, the dyestuffs should be chosen with discrimination. The manufacturers will always supply this information if the dyehouse laboratory is too busy to make the large number of trial dyeings that are involved in the investigation. In the list of colors given below will be found a few that are suited to this method of dyeing. The coloring process is the same as that already described except that an addition of from 3 to 5 per cent of ammonium sulphate or acetate and one-half of one per cent of formic acid should be put in. Although some of the published formulas include salammoniac, it should not be used in baths for dyeing silk because of the adverse effect of chlorides upon that fiber. The dyes alluded to are:

Erie Fast Yellow WB	Diamine Fast Yellow AGGN
Erie Fast Orange A	Diamine Fast Orange EG
Erie Pink 2B	Direct Rose T
Niagara Blue RW	Oxy-diamine Blue PG
Erie Green MT	Union Fast Green GG
Erie Garnet B	Diamine Violet N
Solantine Black L	Union Fast Grey BR
Erie Black GXOO	Diamine Black NW

This is by no means a complete list though it contains a number of good examples. Among those not mentioned will be found many that may be rendered more fast to light by afterchrome treatment though it should not be forgotten that this will seriously degrade the brilliance of the shade.

General Dyestuff Releases

The General Dyestuff Corporation has given to the trade circulars about a new vat color, Indanthren Scarlet 2G Paste, for which is claimed a very good fastness to light, chlorine and washing, as well as good solubility and level properties, thus making it suitable for machine dyeing.

Another new product is Cyanol FFG, a straight acid dyeing color. This brand is described as being a little greener than the older Cyanol FF and is particularly recommended for the dyeing of woolen yarn, piece-goods for ladies' dress goods, hats, etc., where brightness is essential and no special fastness is required, as the fastness to light of Cyanol FFG is only moderate.

The same company has also announced manufacture by the General Aniline Works of Indanthren Red Violet RHA Paste Fine, a vat color which is said to be identical in every respect to the imported Indanthren Red Violet RH Paste Fine. Circulars illustrate the color in dark and light prints and also in prints next to Indanthren Printing Black B Paste.

Elementary Textile Microscopy

Classes of Lighting—Sources—Reflected Light—Transmitted Light—Modified Light—Micrometers—Slides and Cover Glasses

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(Continued from issue of May 12, 1930.)

LIGHTING should always be accomplished in such a way as to bring out the special characteristics of the object. Thus, if the internal structure of an object is to be observed, it will be necessary for the light to pass through the object, this is called transmitted light; if the surface markings are of interest, light would be played upon the object from above and would be reflected into the microscope, this is called reflected light.

According to the direction from which the light rays striking an object originate, light is called axial, oblique, or orthogonal. Orthogonal illumination is obtained when the path of the light rays is at right angles to the axis of the microscope and is used only in the ultramicroscope.

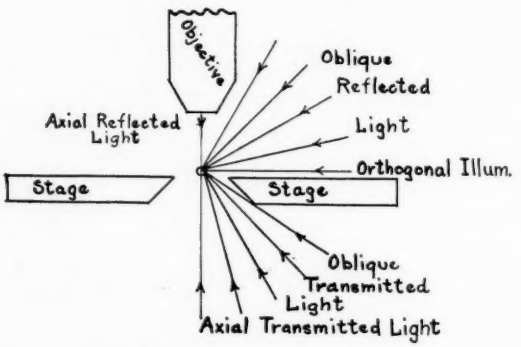

Figure 15. Direction of Lighting.

Axial illumination is obtained when the path of the light rays coincides with the axis of the microscope, the origin of the light may be above or below the object. Oblique illumination is obtained when the path of the light rays is neither axial nor orthogonal and may also be either transmitted or reflected. The following table gives the various accessories used in obtaining the above lightings:

1. Reflected light
   a. Axial—vertical illuminator
   b. Oblique—Silvermann illuminator, arc lamp, various lamps.
2. Orthogonal light—slit ultramicroscope
3. Transmitted light
   a. Axial—mirror, condensers
   b. Oblique—condenser with eccentric diaphragm, dark-ground illuminator.

Sources of Lighting

Possibly the best source of light is daylight, but since daylight is very variable in intensity and not always available, it is better to rely completely on artificial sources.

Figure 16. Chalet Lamp.

The Chalet lamp, a square metal box with overhanging eaves and two, three or four windows of daylight glass, is a very useful source of light for general work. The eaves prevent rays from striking the eyes and the several windows make it possible for several persons to use one lamp.

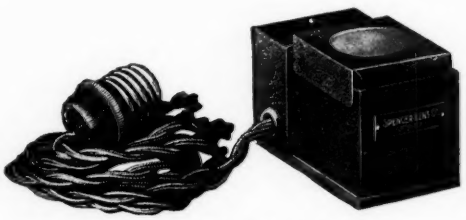

Figure 17. Individual Substage Lamp.

Another very useful lamp, suitable for use by one person, is the so-called "Individual Daylight Lamp." This

is a very small lamp, which may be placed upright to throw light into the mirror, or the mirror may be swung to one side and the light placed upon its back directly under the stage.

Figure 18. Microscope Lamp.

The arc lamp gives the most intense light, but is somewhat more cumbersome. The arc lamp, preferably used on direct current, requires a resistance in series with it; used on alternating current, it requires a transformer for best results. The two carbon poles are placed at right angles to each other and are each adjustable by a screw mechanism. The horizontal carbon should always be the positive pole and is tested as follows: With the resistance in series and the poles apart, plug into the connection socket. By means of the screw mechanism, bring the poles together until they just touch and then bring the poles apart. Allow the light to run for a few moments, then blow it out, and see which pole remains glowing the longer. If the horizontal pole is hotter, the connection is right, but if the vertical pole is hotter, the plug must be withdrawn and reversed. Since the carbons

Figure 19. Automatic Feed Arc Lamp.

are slowly consumed, the arc lamp, while in operation, must occasionally have the carbons brought closer together. On the simpler arc lamps, this is done by hand; but on the better lamps, a clockwork mechanism is supplied which keeps a constant gap between the poles of the lamp. This latter is called an automatic arc lamp and the former a hand arc lamp.

Reflected Light

Axial reflected light is obtained by the use of the vertical illuminator. This is a small device, inserted on the nosepiece and just above the objective; in metallurgical and petrographical microscopes, the vertical illuminator is an integral part of the microscope. The vertical illuminator contains a small opening in one side opposite a small

Figure 20. Metallurgical Microscope with Vertical Illuminator.

right-angled prism or an adjustable glass disk. The rays of light, from an arc lamp or a small concentrated filament light are reflected downward through the objective and illuminate the object.

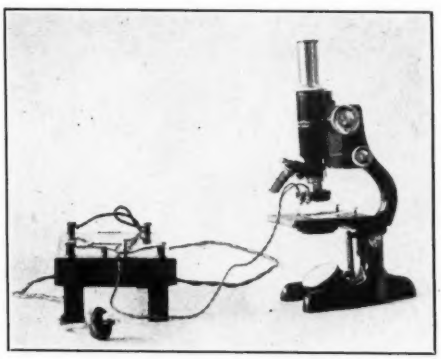

Figure 21. Silvermann Illuminator.

The Silvermann Illuminator gives very oblique light from all directions, thus giving the effect of vertical illumination. This device consists of a small circular lamp supported in a metal holder which encircles the objective and is held in place by the spring pressure of three small fingers. The Silvermann Illuminator always has confined with it a resistance box. Several auxiliary pieces of apparatus enable the light to be supported on the stage, independently of the objective, to mask off a portion of the circumference and obtain oblique light, and to cut

down excess reflection from lustrous objects by means of a disk.

Ordinary oblique reflected light may be obtained by the use of the arc lamp or by any ordinary electric or oil lamp.

Transmitted Light

Ordinarily the mirror alone is used for transmitted light, but when the source is insufficient or a very intense light is required, the condenser is resorted to.

The condenser is a system of lenses mounted beneath

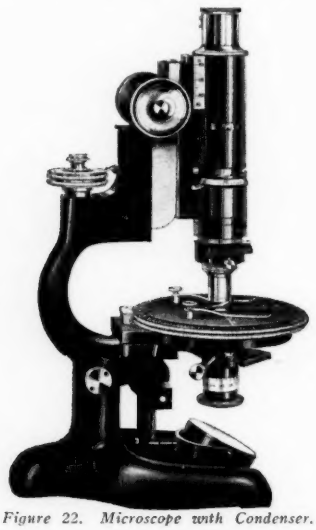

Figure 22. Microscope with Condenser.

the stage. It receives the rays from the full area of the mirror and focuses them to a small area which is thereby intensely illuminated. The mounting of the condenser may be of the simple tube form, which is focusable only within a very small range; the quick-acting screw form; or more desirable, the rack and pinion focusing arrangement. This third form is gradually replacing the second form.

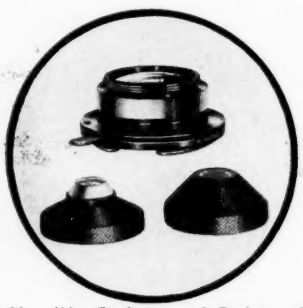

Figure 23. Abbe Condenser and Background Unit.

According to the amount of correction, condensers may be classified as Abbé; Achromatic, aplanatic and cardioid. The Abbé condenser, while satisfactory for most work, has little correction; the achromatic condenser is corrected for two colors and spherically corrected for two zones; the aplanatic condenser is spherically but not chromatically corrected; the cardioid condenser is as completely corrected as possible.

The condenser always has a diaphragm below it to regulate the amount of light allowed to pass through, and in the best condensers this diaphragm may be placed eccentric to the condenser to furnish oblique transmitted light. Where a de-centerable diaphragm is not provided, oblique light may be obtained by covering part of the bottom of the condenser with a card.

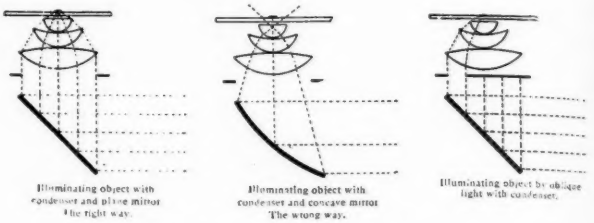
Illuminating object with condenser and plane mirror The right way.
Illuminating object with condenser and concave mirror The wrong way.
Illuminating object by oblique light with condenser.

Figure 24. Use of Abbe Condenser.

The modern Abbé condenser may be obtained in 1.20 N.A. with two lenses or 1.40 N.A. with three lenses. The top lens may be removed for low power work or to be replaced with a special dark-ground element which makes a very satisfactory dark-ground illuminator of the condenser.

Figure 25. Dark-ground Illuminator.

The dark-ground illuminator is used to bring out very small particles distinctly or to provide contrast, the effect being to show objects as white on a black back-ground. The construction is similar to that of the Abbé condenser but with the center of the top lens stopped by a disk so that the object is lighted only by the most oblique rays. The illumination approaches orthogonal lighting and may be substituted for it in some cases. This apparatus is very useful in examining emulsions and suspensions.

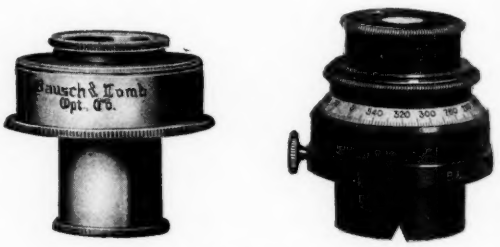

Figure 26. Polarizer and Analyzer.

Modified Light

Polarized light is much used in the examination of fibers since it seems to show up the internal structure better and in the case of some fibers, the play of colors

is a useful characteristic in identification. The apparatus consists of two Nicol prisms—one, the polarizer, mounted below the stage; and the other, the analyzer, mounted either above the objective or above the ocular. The second form is advisable if measurements are likely to be made, as it is graduated in degrees of rotation. Light passing through the polarizer is brought into vibration in one plane and passes through the analyzer if it is parallel to the polarizer but fails to pass through the analyzer if at right angles (crossed Nicols). When the Nicols are crossed,

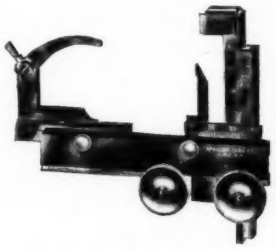

Figure 27. Mechanical Stage.

therefore, the object appears white on a black back-ground. By the use of selenite plates placed on the polarizer, complementary colors of object and back-ground may be obtained instead of black and white.

The use of Rheinberger color disks is similar in principle to the dark-ground illuminator. The center stop is made of a disk of one color and the outside edge of a complementary color. The image appears as a colored object on a back-ground of its complementary color.

Figure 28. Microscope with Mechanical and Rotating Stage.

For the examination of fluorescent materials, ultra-violet light (usually from a mercury arc) is used. In this case, the condenser, slide, and other glassware in the path of the rays must be made of quartz since ordinary glass does not transmit ultra-violet light.

Daylight being made up of light of various wave lengths, and lenses not being corrected for all wave lengths, it is sometimes desirable for very precise work to use light of one color or a very narrow band of color. The use of filters which transmit only certain wave lengths is resorted to in such cases. The Wratten "M" filters are made especially for microscopic work of this nature and are quite satisfactory. The transmission bands of the single filters and some combinations are given in the appendix.

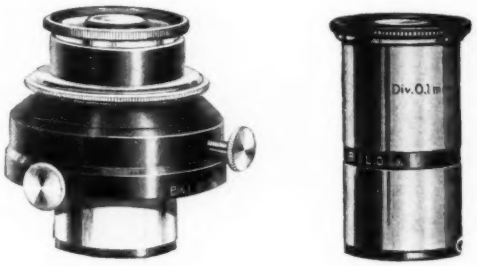

Figure 29. Eyepiece Micrometers.

Mechanical Stage

The mechanical stage consists of two pieces, which may or may not be calibrated and equipped with verniers, at right angles to each other, and which may be fastened onto the stage. By means of two thumb screws, the horizontal piece, holding the slide, may be moved horizontally or vertically, making it possible to systematically search a slide for such purposes as making counts. The calibrations and verniers make it possible to measure objects or distances as small as one tenth of a millimeter.

Micrometers

The common types of micrometers consist of stage, disc, eyepiece, and filar micrometers.

The stage micrometer consists of a scale inscribed on a slide. It is used to calibrate other micrometers. The divisions used are usually tenths of a millimeter, one of which is sub-divided into hundredths of a millimeter.

Figure 30. Filar Micrometer.

The disc micrometer consists of a glass disc with a number of small divisions inscribed upon it. This is dropped into the ocular on the diaphragm. It must be calibrated against a stage micrometer before use.

An eyepiece micrometer is an ocular with a disc micrometer fixed in position in it.

A filter micrometer consists of an eye piece micrometer with one-half millimeter divisions and a movable hair-

line rotated by a drum, one rotation of which moves the hair-line one space or half a millimeter. The drum is sub-divided into fifty divisions so that a hundredth of a millimeter may be read. This also must be calibrated against a stage micrometer.

SLIDES AND COVER GLASSES

The slide acts as a support for disintegrated or small material. Slides may be obtained in almost any size or shape and in three thicknesses, classed as thin, medium, or thick; for all ordinary work the size used is three inches by one inch and medium thickness. For dark-ground illumination the slides are made of quartz so that they may be cleaned by heating, and have a depression for the material to be examined; the thickness must be between 1.45 and 1.55 millimeters.

The cover glass gives a flat upper surface to a liquid mount, thus preventing distortion such as is caused by a meniscus surface, and protects the object from the atmosphere and the objective from contact with mounting fluids. Cover glasses may be square, rectangular or round and of any size, but three-quarter inch circles are generally used. Cover glasses are classified by thickness as follows:

No. 1—0.13—0.17 mm.
No. 2—0.17—0.25 mm.
No. 3—0.25—0.50 mm.

No. 2 thickness is generally used, since dry objectives are designed for work with cover glasses of 0.18 mm. thickness or within .03 mm. of it. With immersion objectives, the thickness of the cover-glass is immaterial, so long as it is less than the working distance of the objective. Using a dry objective, an increase of tube length of 30 mm. balances a decrease in cover-glass thickness of .03 mm. but this correction is undesirable if the correct size can be obtained.

Used slides and cover glasses may be cleaned by boiling in dilute alkali, followed by rinsing in hot and cold water, soaking in chromic acid cleaning solution, rinsing in water, and storing in alcohol.

(*To be continued*)

New "Pharmacine" Dyes

In the advertising pages of this issue will be found an announcement of Pharma-Chemical Corporation to the effect that they have developed an entirely new series of dyestuffs to be known as "Pharmacine" colors and which will be sold exclusively by Carbic Color & Chemical Company. These dyes in a wide range of shades are reported as being of the acid type, particularly suited to printing both silk and wool and possessing good fastness to both washing and light.

It will be recalled that about six months ago it was announced that a community of interest had been established between these two concerns in that C. W. Kuhl, president of the Carbic Color & Chemical Company, had acquired stock interest in the Pharma-Chemical Corporation and that Albert J. Farmer, president of Pharma-Chemical Corporation, had in turn acquired an interest in the Carbic Color & Chemical Company. It is assumed that the announcement regarding "Pharmacine" dyes is in line with the developments which might be expected from this liaison and that further announcements of a similar nature may be made from time to time in the future.

Paterson Public Schools' Textile Exhibit

Textile designing has always been part of the art curriculum of the Paterson Public Schools. And the exhibitions held each year have shown some very fine artistic talent. The present exhibit, however, far surpasses any other held by the schools. Thousands of designs were submitted and when asked to select designs worthy of exhibition the manufacturers and designers found the general standard so high they felt all should be shown. Since there were thousands this was impossible due to the limitation of space.

The exhibition is remarkable in that the coloring in many of the drawings show unusual ability in working out the color scheme that would do credit to some of our well known textile designers, and it was necessary to select designs from the standpoint of those which would fit in with the color scheme and do justice to the fine lines of the building.

In addition to the sketches for designs and those carried out in machine-made products, examples of various hand-decorated fabrics are also shown.

Paterson should feel proud of the high class work in textile designing shown by the students of the public schools.

Hazard Moves to New Offices

It has been announced recently that the Hazard Advertising Corporation, counsel to many of the leading companies in the textile field, has moved from the offices which it has occupied during the past ten years to new and larger quarters at 295 Madison Avenue, at the corner of 41st Street, New York City.

The May issue of Dyestuffs, monthly publication of the National Aniline & Chemical Company, Inc., is devoted mainly to a résumé of many of the uses and methods of application of National Erie Black GXOO.

Formulas for producing the fall 1930 shoe and leather colors recently released by the Textile Color Card Association are also included in this issue.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

President
E. H. KILLHEFFER
Newport Chemical Works, Passaic, N. J.

Vice-Presidents
WALTER S. WILLIAMS—P. J. WOOD

Treasurer
HARRY R. DAVIES

Secretary
ALEX MORRISON
American Woolen Co., Andover, Mass.

Councilors

RALPH F. CULVER	GEORGE A. MORAN
B. F. PHETTEPLACE	HUGH CHRISTISON
WILLIAM R. MOORHOUSE	WALTER M. SCOTT

Past President and Chairman of the Research Committee
LOUIS A. OLNEY
Lowell Textile Institute, Lowell, Mass.

LOCAL SECTIONS AND THEIR OFFICERS

Northern New England Section—
William H. Cady, Chairman, Slater Company, Inc., Webster, Mass.
Harold C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Rhode Island Section—
Richard B. Earle, Chairman, 133 Power St., Providence, R. I.
A. Newton Graves, Secretary, Franklin Process Co., Providence, R. I.

New York Section—
P. F. Kingsbury, Chairman, Passaic Print Works, Passaic, N. J.
W. H. Wingate, Secretary, 318 Bogert Avenue, Ridgewood, N. J.

Philadelphia Section—
A. M. Burt, Chairman, 1046 Public Ledger Building, Philadelphia, Pa.
Percival Theel, Secretary, Philadelphia Textile School, Philadelphia, Pa.

Piedmont Section—
R. M. Mitchell, Chairman, 808 Cypress Street, Greensboro, N. C.
Arthur R. Thompson, Jr., Secretary, 1109 Independence Building, Charlotte, N. C.

South-Central Section—
R. S. Wheeler, Chairman, Crystal Springs Bleachery, Chickamauga, Georgia.
Lee Roy Hiller, Secretary, Crystal Springs Bleachery, Chickamauga, Ga.

Midwest Section—
Carl E. Bick, Chairman, Real Silk Hosiery Mills, Indianapolis, Ind.
William Bergh, Jr., Secretary, Vassar Swiss Underwear Co., Chicago, Ill.

Lowell Textile Junior Section—
Earle R. McLean, Chairman: Alfred J. Carbone, Secretary.

SIXTY-FOURTH COUNCIL MEETING, MAY 1, 1930

THE SIXTY-FOURTH Council Meeting of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., at 2:10 Friday afternoon, May 1, 1930.

In the absence of President E. H. Killheffer, Vice-President P. J. Wood presided.

The other officers and councillors present were:

Vice-President: W. S. Williams.

Treasurer: H. R. Davies.

Councillors: George A. Moran, Hugh Christison, Wm. R. Moorhouse.

Councillors (ex-officio): Wm. H. Cady, Chairman, Northern New England Section; Prof. L. A. Olney, Chairman, Research Committee.

Secretary: Alex. Morrison.

The Secretary's report of the last Council Meeting was read and accepted.

The Secretary's financial balance sheet was read as follows and approved:

Financial Report of Secretary—April 30, 1930

Cash on hand Andover National Bank 3/19/30	$412.44
Receipts 3/19/30 to 4/30/30, inclusive:	
Applications (24 @ $5.00)	120.00
1930 Dues (90 @ $5.00)	450.00
Atlas Electric Devices Co. Royalties	11.00
Howes Publishing Co. (Reporters)	6.25
Howes Publishing Co. (Year Book Acct.)	300.47
16 Year Books	48.00
	$1,348.16
Disbursements:	
4/7/30 to Treasurer—Research Fund	$36.00
4/7/30 to Treasurer—General Fund	800.00
3/28/30 Exchange Charge	.25
Cash on hand 4/30/30	511.91
	$1,348.16

The Treasurer's report as follows was read and approved:

Treasurer's Report—November 8, 1929, to May 1, 1930

General Fund:		
Balance 11/8/29	$6,106.60	
Receipts to 5/1/30	5,679.14	
		$11,785.74
Expenditures 11/8/29 to 5/1/30	2,913.78	

Balance		$8,871.96
Research Fund:		
Balance 11/8/29	$2,487.16	
Receipts to 5/1/30	2,189.82	
	$4,676.98	
Expenditures 11/8/29 to 5/1/30	1,932.26	2,744.22
		$11,616.18

The following were elected to membership:

Active

Binns, Jack W., 1 Dustin St., Peabody, Mass. Chemist and assistant dyer, Danvers Bleachery, Peabody, Mass.

Jackson, Thomas, Eastwood Post Office, Ont., Canada. Supt. hosiery dyer, Hosiers, Ltd., Woodstock, Ont., Canada.

Kelleher, Daniel J., 3123 Kimball Ave., Toledo, Ohio. Supt. dyeing and finishing, Toledo Dye Works, Div. Textileather Corp., Toledo, Ohio.

Oesterreich, Irvin E., 2539 Maitland Court, Milwaukee, Wisc. Supt. of dyeing, Phoenix Hosiery Co., Milwaukee, Wisc.

Powell, Guy, 3929 No. Keeler Ave., Chicago, Ill. Demonstrator, Scholler Bros., Philadelphia, Pa.

Staple, R. C., 2007 McCallie Ave., Chattanooga, Tenn. Salesman, Mathieson Alkali Works, P. O. Box 483, Chattanooga, Tenn.

Junior

Sturtevant, Fred W., 44 Water St., Guilford, Maine. Overseer of chemistry and dyeing, Old Town Woolen Co., Guilford, Maine.

Tarshis, Elias A., 28 W. Warren St., Washington, N. J. Asst. dyer, Pohatcong Hosiery Co., Washington, N. J.

Associate

Bowes, L. M., Southern Manufacturers Club, Charlotte, N. C. Dye salesman, Chemical & Dye Corp., Springfield, N. J.

The following were elected to membership as of May 14th, 1930, a date thirty days after their names were published, provided no objections are received to any of them by the Secretary before then.

Active

Braham, Chester M., 201 Rutland Road, Brooklyn, N. Y. Manufacturer of Textile Chemicals, Arkansas Co., Inc., 233 Broadway, New York, N. Y.

Healy, Jr., John J., 1119 Boylston St., Newton Upper Falls, Mass. Chemical engineer, Merrimac Chemical Co., Inc., 148 State St., Boston, Mass.

McCarthy, Justin J., 69 School St., Arlington, Mass. Sales dept., Merrimac Chemical Co., Inc., 148 State St., Boston, Mass.

Purvis, Fred H., 4 Wakefield St., Webster, Mass. Dyer, S. Slater & Sons, Webster, Mass.

Ramm, Dr. Marie S., 17 Willow St., North Adams, Mass. Chemist, Arnold Print Works, North Adams, Mass.

Serra, Dominick R., 184 Belvidere Ave., Washington, N. J. Head dyer, Pohatcong Hosiery Mills, Washington, N. J.

Wielenga, Andrew, 114 North 13th St., Prospect Park, N. J. Foreman finisher, Oriental Silk Printing Co., Haledon, N. J.

Junior

Audette, Romeo J., 723 So. Main St., Attleboro, Mass. Foreman dyer, Fall River Bleachery, Fall River, Mass.

Haar, Lawrence F., 106 South Sixth St., Washington, N. C. Student, North Carolina State College, Raleigh, N. C.

Hanes, A. Thomas, 236 Lockland Ave., Winston-Salem, N. C. Demonstrating salesman, Sandoz Chemical Co., Box 81, Charlotte, N. C.

Kohn, George E., 4526 Spruce St., Philadelphia, Pa. Salesman and Demonstrator, Celanese Corp. of America, 1046 Public Ledger Bldg., Philadelphia, Pa.

Purcell, Eugene, Wentworth, N. C. Student, North Carolina State College, Raleigh, N. C.

Schmottlach, William E., 508 Howard St., Lawrence, Mass. Dyer, Farwell Bleachery, So. Canal St., Lawrence, Mass.

A list of delinquent members was presented and it was voted that these members be dropped according to the Constitution but that a notice be sent to each to this effect and advising them they would be reinstated at the next Council Meeting if their dues were paid by that date.

Mr. Wood briefly outlined the results of a recent meeting held in New York of representatives of various associations with our Research Conference Committee in regard to formation of a General Research Institute.

He also reported on the meeting of the Committee with the Textile Research Council and representatives of a number of other associations held in Boston April 30th, 1930. At this meeting, Dr. Killheffer presented a resolution as follows, which was unanimously adopted.

"Whereas, this is a meeting of all interested associations and bodies having as an object the establishment of some centralized American institute for textile research, therefore, be it

"Resolved, that it is the sense of this meeting that the following bodies, or associations, be each invited to elect, or appoint, one person as a member of a preliminary board of directors of a centralized American institute for textile research. (See accompanying list.)

"Be it further Resolved that, for the purpose of sending

this resolution and accompanying invitation to the various bodies and associations, an invitation committee be hereby created to consist of two members each from the American Association of Textile Chemists and Colorists and the Textile Research Council, and be it further

"Resolved, 'that the meeting of the preliminary board of directors be for the purpose of considering and adopting some definite plan of organization."

THE ASSOCIATIONS INVITED

American Cotton Manufacturers Association
American Association of Textile Chemists and Colorists
Associated Knit Underwear Manufacturers Association
Cotton-Textile Institute
Institute of Carpet Manufacturers of America, Inc.
National Association of Cotton Manufacturers
National Association of Finishers of Cotton Fabrics
National Association of Hosiery and Underwear Manufacturers
National Knitted Outerwear Association
National Association of Wool Manufacturers
Silk Association of America
Southern Textile Association
Rayon and Synthetic Yarn Association
Textile Research Council
Wool Institute
American Lace Manufacturers Association
Silk Dyers Association of America
Association of Cotton Textile Merchants of New York
Converters Association
National Association of Shirt Manufacturers
Wholesale Dry Goods Institute
National Retail Dry Goods Association
Textile Section American Society of Mechanical Engineers
Committee D-13, American Society for Testing Materials
Silk Dyers and Printers Association
Laundryowners National Association
National Association of Dyers and Cleaners of U. S. and Canada
Better Fabrics League of America
American Home Economics Association

U. S. GOVERNMENT DEPARTMENTS AND BUREAUS

Department of Commerce:

Textile Division, Bureau Foreign and Domestic Commerce
Bureau of Standards

Department of Agriculture:

Bureau of Agricultural Economics
Bureau of Plant Industry
Bureau of Animal Industry
Bureau of Chemistry and Soils
Bureau of Public Roads
Bureau of Home Economics

TEXTILE SCHOOLS

A. French Textile School, Georgia School of Technology, Atlanta, Ga.
Bradford-Durfee Textile School, Fall River, Mass.
Textile Dept. Clemson Agricultural College, Clemson College, S. C.
Lowell Textile Institute, Lowell, Mass.
New Bedford Textile School, New Bedford, Mass.
North Carolina Textile School, Raleigh, N. C.
Philadelphia Textile School, Philadelphia, Pa.

The Committee of Invitation created by the above resolution was made up of P. J. Wood and Dr. W. M. Scott of our Association and Dr. W. F. Edwards and C. H. Clark of the Textile Research Council. This committee has sent invitations to the associations listed calling a meeting for the 23rd of May in New York.

President E. H. Killheffer was elected as our representative to this meeting and Dr. Jos. F. X. Harold was elected as an alternate.

The following application for the formation of a Junior Section at the North Carolina State College was received and approved:

Council of The American Association of Textile Chemists and Colorists,
Attention of President E. H. Killheffer.

Dear Sir:

At a meeting on Saturday, April 12th, held at North Carolina State College by a group of students and graduates, plans were discussed in regard to forming a junior section of your organization at the Textile School of North Carolina State College.

Therefore, the following present junior members of the Piedmont Section respectfully request that they be permitted to have a Junior Section of the American Association of Textile Chemists and Colorists to be located at the Textile School of North Carolina State College at Raleigh, N. C.

W. H. Barnhardt; J. W. Black; E. A. Feimster; R. A. Field, Jr.; C. D. Forney, Jr.; R. A. Gilliam; L. F. Haar; D. B. Hardin; H. L. Harris; W. F. Isom; K. C. Laughlin; T. H. Nelson; W. A. Pardue, Jr.; E. Purcell; R. H. Webb.

Promised to join: J. J. Brown; D. Gryder; N. A. Long; T. Hanes; F. R. Love; H. D. Atkinson; T. A. Mott; G. E. Michael; D. M. Bailey; A. H. Thomas.

Chairman Mitchell of the Piedmont Section is helping us to form this section and has offered to aid us in any way possible. Very truly yours,

(Signed) D. B. HARDIN, *Acting Secretary*,
North Carolina State College Textile School,
Raleigh, N. C.

It was voted to instruct Chairman R. M. Mitchell of the Piedmont Section to call an organization committee meeting of this section.

It was voted to appropriate $150.00 for the temporary employment of Earle R. McLean as a Research Assistant at the Lowell Textile Institute during two months of the Summer.

The Secretary was instructed to officially notify Dr. Jos. F. X. Harold, W. S. Williams and Henry F. Herrmann that they were the Technical Program Committee for our next Annual Meeting.

The Secretary was also instructed to prepare proper vouchers for the payment of the prizes awarded for best papers presented before the Association Meetings last year, and which were announced at our last Annual Meeting.

The meeting adjourned at 3:00 P. M.

Respectfully submitted,

ALEX. MORRISON, *Secretary.*

APRIL MEETING OF THE NEW YORK SECTION

THE regular monthly meeting of the New York Section of the American Association of Textile Chemists and Colorists convened Friday evening, April 25, 1930, at the Building Trades Employers' Association, 2 Park Avenue, New York City, P. F. Kingsbury, Chairman of the Section, presiding.

The routine business of the Section was transacted.

Chairman Kingsbury: Our first speaker this evening, gentlemen, is R. H. Gale, Technical Representative of Wallerstein Co., Inc., whose subject is, "Rapidase and Its Practical Application." Mr. Gale! (applause).

Rapidase and Its Practical Application

By R. A. GALE

Wallerstein Co., Inc., New York

THERE are numerous processes thru which fabrics must pass before they are ready for the market. Among the more important of these may be mentioned: bleaching, dyeing, printing, mercerizing, crepeing and finishing. Each of these processes properly includes a number of auxiliary processes. It is in the application of Rapidase in the auxiliary processing of fabrics that we are interested this evening.

The active principles of Rapidase are enzymes. Although not actually alive, enzymes in their behavior resemble living organisms in some respects. They are influenced by many conditions such as temperature, pH, and the presence of salts and protective agents. The practical value of Rapidase, therefore, depends to a large extent upon the control of those conditions which affect the stability and action of its enzymes.

In Rapidase there are several types of enzymes. The two most prominent of these are the amylolytic and proteolytic enzymes. The amylolytic enzymes (or amylases) have a specific action on starches and starch degradation products. The proteolytic enzymes (or proteases) digest proteins such as gelatine, casein, sericin and albumen. There also exists in Rapidase an enzyme which is capable of hydrolyzing certain vegetable oils and fats. Due to the relative sensitivity of these enzymes, however, they have not so far attained the same degree of importance in the textile industry as have those of the amylolytic and proteolytic types respectively.

The manufacture of Rapidase is interesting, as the process represents one of the most modern achievements of biological control. Certain micro-organisms of a particular class are permitted to propagate in sterlized solutions of a nitrogenous character. As they develop, various enzymes are produced. The organisms are then removed and the solution containing the enzymes is further processed to form the commercial product Rapidase.

In the processing of piece goods there frequently arises a necessity for removing certain gums, proteins and starches. Some of these substances may occur naturally with the fibers, while others may be added to the yarn or fabric to accomplish a particular purpose. Cotton, rayon and woolen yarns are frequently sized before being woven, and the sizing materials used may consist of various gums, oils and waxes. Raw silk filaments in their development by the silk worm become coated with a protein substance known as sericin. This coating serves as a natural sizing and is taken advantage of to protect the silk filaments during the weaving process.

It is, of course, not always necessary to remove these gums from the fabric. The need for their removal depends largely on the quality of work being done. Before dyeing solid colors on fabrics consisting of one type of fiber only, both warp and filling should be made equally receptive to the dyestuff. It is then necessary to remove the gums or sizing before dyeing.

With mixed goods in which it is desired to keep one of the fibers white, an advantage is sometimes gained by leaving the gum or size on the white thread until after the other has been dyed. The gum thus serves as a resist and lessens the tendency of the white fiber to become tinted. The gum can then be removed after dyeing, if necessary.

Yarn dyed goods are frequently stripped of all sizing materials so as to eliminate the harsh feel which their presence is apt to cause.

Before bleaching fabrics it is desirable to remove as much as possible of the sizing and other material which is present so as to insure uniformity and permanency of the bleach and to avoid the necessity of using excessively high concentrations of chemicals which would otherwise be required.

Crepes frequently contain a sizing which must be

removed in order that the crepeing action may proceed properly. The manner in which the sizing is softened or removed has an important bearing on the quality of the resulting crepe.

Printing gums must be removed in order to eliminate hard spots. Some of the gums commonly used for printing are not easily washed out, and the use of enzymes in such cases may be found helpful.

There is no single term which adequately describes all of the various processes in which enzymes are utilized. Desizing, stripping, malting, degumming and boiling off are among those commonly used to indicate some process the object of which is to remove or modify some gum-like or adhesive substance. The term "desizing" implies the breaking down or removing of the warp size contained in fabrics. The most commonly used adhesive in warp sizing is starch, and amylase is the enzyme which is required to digest it. Degumming usually refers to the process of removing the natural gum from silk. This gum, being a protein, is acted upon by proteolytic enzymes. For the sake of simplicity, therefore, I shall use the term "desizing" to describe those processes in which amylolytic action predominates; and for a similar reason, the term "degumming" when proteolytic action is primarily involved.

Enzymes, even tho belonging to the same classification, vary greatly in their chemical properties, depending upon the source of their development. For example, the amylase of malt has a certain well defined operating range of temperature and pH, and it converts starch to maltose. The amylase contained in Rapidase on the other hand operates best under different conditions and brings about the degradation of starch in a different manner.

The practical value of enzymes depends upon their correct functioning. We must, therefore, consider not only those factors which influence the means by which the enzyme digests or dissolves its substrate; but also, those factors which influence the stability or life of the enzyme. Of these, the latter are obviously of primary consideration, for unless the enzyme be present in an active state, it will not function at all.

The influence of temperature on the stability of amylases of different origins has been studied by a number of investigators. Their results indicate that the stability or heat resisting factor is characteristic of the particular amylase. Eristrom, for example, found that the amylase of malt is more resistant to heat than that of saliva. He found that complete inactivation of malt amylase occurs at a temperature of 60° C. in 1 hour, and of the amylase of saliva at a somewhat lower temperature.

Our laboratories found that commercial malt extract solutions lose 85 per cent of their amylolytic activity in 1 hour at 60° C. and 72 per cent in 30 minutes. Similar tests with Rapidase in weakly saline and alkaline solutions showed losses of 12 per cent and 0 per cent under the corresponding conditions of time and temperature.

The importance of this heat resisting factor of amylase becomes apparent when some of the conditions encountered in practical desizing are considered.

One of the practical methods of desizing cotton fabrics is to pass them thru a hot amylase solution and then hold the saturated goods for a certain period of time before rinsing them. Due to the high speed at which the cloth travels thru the solution, it remains submerged for only a few seconds. The greatest part of the desizing or starch conversion, therefore, takes place during the retention or so-called lay-off period and is effected by that portion of the amylase solution which has been absorbed by the fabric. It is therefore necessary that mechanical conditions should be such as to insure a thoro saturation of the fabric. As a rule, a fairly large volume of solution is maintained in the machine so as to assure complete saturation and the level is kept constant by a continuous inflow of fresh solution.

As the cloth passes thru, only a relatively small quantity of the solution is absorbed immediately and an extremely large portion remains idle for a considerable period of time. For example, if the capacity of the box is 215 gallons or about 1800 lbs., and the solution is being removed by the cloth at the rate of 30 lbs. per minute, a complete turnover of the solution will be effected in about an hour. Some fractions of the hot solution actually remain out of the sphere of action for an hour while others are absorbed almost instantly. The average time of exposure in this case is therefore something in the neighborhood of one half hour. In short, the average amylase particle remains exposed to the bath temperature for 30 minutes before it does any work. The solution loses its activity during this time in accordance with the stability factor of the amylase employed. It should be pointed out that once the amylase comes in contact with the starch contained in the fabric, the danger of loss of activity is materially lessened because it is much more resistant to heat in the presence of starch.

When one considers also that machines are frequently stopped for varying periods of time, thus increasing the time of exposure of the amylase solution, the significance of the stability factor becomes even more apparent.

Because of the high stability factor of its amylase, Rapidase can be used for desizing at relatively high temperatures. The practical range is from 20° to 80° C. For most purposes, temperatures of 70° to 75° C. are recommended. If a large standing bath is to be maintained, lower temperatures should be used. On the other hand, in cases where all of the amylase is brought quickly into

the field of action, as for example, in jig desizing, temperatures up to 80° C. can be employed.

Gray goods should whenever possible be desized at high temperatures since penetration of the fabric is accelerated. Waxes, fats, etc., if present, are more easily removed, and conversion of the starchy matter also proceeds faster at the higher temperatures.

A point of interest concerning Rapidase solutions is the influence of certain substances on the stability of the amylase. It has been found that the presence of starchy matter in small quantities materially increases the stability. In a practical desizing range, therefore, the bath becomes more stable as the accumulation of starchy matter extracted from the fabric increases.

Sodium chloride for some reason not yet clearly explained also increases the stability factor of the amylase. Whenever temperatures above 60° C. are being employed, it may therefore be advisable to add a small quantity of salt to the water before preparing the solution. The effect is most marked with concentrations up to 4 lbs. of salt per 100 gallons. Concentrations greater than 10 lbs. per 100 gallons produce no further increase in stability.

The influence of pH on the amylase is of importance from the practical standpoint. While the amylase under certain conditions is capable of converting starchy materials between pH 5.0 and pH 11.0, it appears that the liquefaction of raw starch occurs most rapidly at pH 7.0 to 7.5.

As a general rule, it is advisable to prepare the solution on the weakly alkaline side by adding a few ounces of soda ash per 100 gallons. The reason for this is that gray goods sometimes contain small quantities of acidic substances which may accumulate in the bath and render it weakly acid. The small amount of alkali offsets this possibility and does not decrease the stability of the amylase at all.

Most warp sizing formulae include, in addition to starch, some sort of lubricant or softening agent. Tallow, soluble tallow, various oils and soluble oils, and waxes are among those commonly employed. Not infrequently a certain amount of free fatty acid is introduced. As fatty acids are not soluble in neutral or weakly acid solutions, considerable difficulty is sometimes experienced in removing them. Their presence not only acts as a resist to the penetration of the amylase but also to the other chemicals or dyestuffs which may subsequently be used. The use of alkaline desizing solutions in such cases is therefore preferable.

In dealing with a given desizing problem, therefore, it may be advisable to experiment with desizing solutions of varying pH, using soda ash as required.

The manner in which the amylase functions is also characteristic. It first converts starch to soluble starch and subsequently to dextrines and certain forms of sugars. The initial or liquefying action is extremely rapid. In fact, it was this property which gave rise to the name Rapidase. A peculiar fact is that the end products formed have only a very low reducing action.

Some dyestuffs are sensitive to the influence of reducing sugars. The introduction of reducing matter either before, during or after dyeing, must consequently be avoided. The generally low reducing value of Rapidase and of the end products of its hydrolysis make it particularly valuable for purposes of desizing where such a condition is to be avoided. In many instances of desizing before dyeing it is unnecessary to rinse between operations. In fact dyeing is sometimes done in the same bath. Goods which are to be bleached with chlorine or other oxidizing agents are as a rule desized first. The absence of reducing matter as the cloth enters the bleaching solution is obviously desirable.

The proteolytic enzymes of Rapidase have somewhat different characteristics from the amylase. They function best at temperatures of about 55° C. for most purposes and in solutions which are neutral or weakly alkaline. The presence of small quantities of olive oil soap tends to increase their action on sericin.

Their chief practical value lies in their ability to degum fabrics which would be otherwise injured by the customary soap boil-off treatment, and in the simultaneous desizing and degumming of mixed goods. In dealing with sizing materials which consist of both proteins and starches, both enzymes work together. Fabrics made up of a starch sized warp and raw silk filling can be desized and partially degummed simultaneously in a short time. The subsequent boil-off necessary to complete the removal of the sericin can then be shortened.

In certain other cases an advantage is gained by first partially degumming with soap and later treating with the protease. A closer fabric results with this method than if the boil-off is completed with soap alone, and there is less tendency for the fibers to slip and impart a cracked appearance to the fabric.

Some fabrics in addition to being desized must also receive a light scour. While both these operations can be combined if a moderate temperature is used, it is better, if possible, to permit the enzymes to act before adding the scouring materials, particularly if strong alkaline compounds are being used.

The use of penetration assistants in conjunction with Rapidase is sometimes advisable. While our experience has been that these agents do not as a rule increase the rate of hydrolysis by the enzyme, they sometimes produce a greater net efficiency by increasing absorption by the fabric thus bringing more of the enzyme into contact with the substance to be removed. Heavy fabrics which are being passed rapidly thru a small volume of the solution do not always absorb enough of it to assure uniform and efficient action. In such cases an advantage may be gained by adding a small quantity of a suitable penetra-

tion assistant. If the fabric receives a fairly long immersion period, there appears to be no material advantage in adding any assistant.

Desizing of fabrics which for one reason or another must be treated at low temperatures is sometimes benefited by a penetration assistant.

Pine oil has been found very satisfactory but its value is limited by its low solubility. It can be used with carriers such as iso-merpin and others provided they do not interfere with the proper functioning of the enzyme.

Commercial products such as Nekal BX, Iso-merpin, Neo-merpin, Tensol and others have been used with some degree of success. Of these, at the time the tests were made, Nekal BX had the advantage of being more nearly neutral in reaction than the others and therefore causing no appreciable change in pH of the Rapidase solution. It is to be noted that no attempt was made to determine the comparative merit of these products from the standpoint of wetting efficiency. Our chief concern was with their influence on the stability and action of Rapidase.

The mechanical methods of applying Rapidase in practice are very numerous and are usually determined by the nature of the work and quantity of goods being handled. The methods do not differ materially from those employed for other purposes such as dyeing, bleaching, washing, etc.

In general, the longer the period of immersion in the desizing solution the shorter is the time required for the process. Using Rodney Hunt reel machines or others of similar construction, complete desizing can be effected in a matter of a few minutes. On the jig, desizing can be accomplished in two ends or passages.

The system of impregnating and batching, previously referred to, relies upon the quantity of amylase solution absorbed by the fabric for the desizing process. A machine equipped with a number of separate and small boxes, each of which carries a nip, makes an efficient layout. The intermittent immersing and squeezing insures rapid and uniform action. If the fabric is being handled in open width, it is preferable to shell it up rather than plait it into boxes because a more uniform temperature throughout the lot is thus obtained. If a large production of a certain type of work is in progress, the installation of a heated J box, or some other form of accumulating device in which the temperature is kept up, can be used to advantage.

Where singeing of the cloth is required, a convenient way is to apply the desizing solution immediately as the cloth leaves the singer. The solution then also serves as a quench and the heat of the incoming fabric is relied upon for the maintenance of the bath temperature. In such cases, the first batch of desizing solution is prepared hot so as to warm up the machine. Subsequent batches which are to be fed during the day are prepared cold or lukewarm. Because of the high stability factor of Rapidase it is unnecessary to use cooling pipes or to resort to a continual overflow in order to keep the temperature down.

The use of jigs for desizing is quite prevalent. For cotton or rayon goods where the ratio of goods to water lies between 1:2 and 1:3 by weight, it is sometimes convenient to eliminate the necessity for control of temperature in the following manner: The water is drawn and then heated to a real boil. The steam is then shut off and the roll of cloth given one end or passage. This serves to soften the size and penetrate the fabric and in addition to reduce the temperature to a point within the safe working range of Rapidase. A little salt, or possibly soda ash, and the required quantity of Rapidase are then added. The fabric is then given two or more ends required before dyeing. Of course, it is better to use a thermometer and maintain a practically constant temperature, but when one man has to watch several jigs he cannot always take the necessary time.

In the bleachery cotton goods are frequently desized before kier boiling. In this case, the object is to remove as much as possible from the cloth without tendering or injuring the cotton. For this purpose, the use of an alkaline Rapidase bath is recommended. It digests the starch and dissolves fatty acids without the slightest injury to the cotton cellulose.

In some instances desizing is done in the kier before the caustic is added. This method has the advantage that handling of the cloth is reduced and for certain light constructions is desirable. The goods are usually wet out with a weak Rapidase solution and laid down in the kier. A stronger solution is then made up and is circulated thru the goods with gradually rising temperature for an hour or so. With this system it is of the utmost importance that conditions be such as to cause thoro saturation of the cloth. Unless an efficient machine is used for wetting the goods before entering the kier, a small quantity of some penetration assistant should be added to the Rapidase solution.

In connection with desizing before kier boiling or bleaching, it may be interesting to compare the merit of enzymes for this purpose with sulphuric acid. It is believed by some that acid as it is employed in practice affords a cheaper means of desizing. Results of recent experiments on cloth at temperatures varying from 40° C. to 70° C. over varying time periods do not support this belief. It was found that Rapidase is by far the more efficient starch remover. At higher temperatures acid becomes much more effective but its action on the cellulose also increases to such an extent as to render the use of higher temperatures absolutely impractical.

Using temperatures and concentrations of acid at which the danger to the cellulose would be reduced, it was found impossible to properly remove the starch. With Rapidase,

on the other hand, complete removal can be easily effected without the least possibility of tendering the cloth.

The use of acid before kier boiling makes it necessary to rinse out the goods thoroly with large volumes of water before entering them into the kier, otherwise a loss of caustic value will be incurred.

Another use for Rapidase in the bleaching and finishing plants is in stripping finishes from goods which must be refinished according to a different formula or specification. Bleached or light colored goods which are to be refinished without re-bleaching or dyeing should be treated with solutions which are clear and colorless. A clean supply of water is essential and the use of a practically colorless grade of Rapidase is especially recommended.

In the print works Rapidase is used for softening the back grays and in the preparation of the print cloth. It is also used quite extensively for the purpose of removing printing gums and any of the remaining warp size before finishing. With vat dyed prints a soaping treatment is usually required after oxidizing. Rapidase has been used satisfactorily in conjunction with this soaping process. The goods upon leaving the oxidizing bath, may be either acid or alkaline, depending upon the oxidizer used. They must therefore either be rinsed before entering the soap and Rapidase bath or else the condition must be offset by adding the necessary neutralizing medium to the solution. The use of a pure olive oil soap is preferable and the mixed solution should be just sufficiently alkaline to prevent breaking of the soap. An excessive alkalinity should be avoided.

A discussion of this character would not be complete without some reference to the methods of controlling the strength and values of enzyme solutions. From the foregoing discussion, it is obvious that the value of an enzymatic product depends wholly upon the particular set of conditions under which it is required to operate. We therefore must differentiate between methods of control and methods of evaluation.

Control methods are those which are used for checking or confirming samples of the same enzyme preparation under certain fixed conditions. By means of a control method the strength or value of different shipments of the same product can be checked and the strength of a given desizing bath or solution determined.

Methods of evaluation on the other hand must be based upon such conditions as the particular characteristics of the enzyme, the actual conditions under which it operates in practice and the purpose or purposes for which it is used.

While it is a comparatively simple matter to test or compare enzymes of the same origin, there cannot be any one general method by which all enzymes, regardless of their source of origin or the purposes for which they are to be used, can be evaluated.

Amylase solutions are usually controlled in the laboratory according to their starch liquefying power under their respective optimum conditions of pH, temperature, etc. One of the most satisfactory methods is that of Prof. Effront. By means of this method the number of grams of starch which one gram of enzyme product is capable of completely liquefying under the stated conditions is determined.

Methods based upon saccharifying or dextrinizing power are of doubtful value in controlling amylases for textile use. As a general rule, the practical value of an amylase is determined by its ability to convert starch to compounds which can be easily rinsed out. It is not necessary to carry the conversion either to dextrines or sugars.

Protease solutions are controlled according to their casein digesting power, their gelatin liquefying value, or their capacity for degumming raw silk. The details of these methods are too numerous to discuss at this time.

Another form of control relative to the practical use of enzymes is that which deals with the results produced by the process. How to determine whether the process has been extensive enough is not always a simple matter, the obvious reason being that there may be any number of different objectives of the process.

The desizing or degumming process may be controlled by the feel of the fabric, the absorbency to a standard alcoholic solution of stain, by the loss in weight and the general appearance.

The iodine test is used frequently as a qualitative test for starch. It is not generally known that iodine reacts with many substances to form colored compounds varying from brown thru red, purple to blue and black. Some forms of modified starch give a much more intense coloration than others and it frequently occurs in actual practice that fabrics containing only a trace of starchy matter show an intense blue coloration while others, containing much more of a slightly different form of starch, show a lighter coloration. Iodine also reacts with starches which may be quite soluble in cold water and which would therefore be removed by rinsing. Mercerized cotton reacts with iodine to form an intense blue black coloration. Cotton and certain forms of rayon if over kier-boiled may react with iodine even in the complete absence of starch. It is stated that oxy-cellulose and hydro-cellulose may both yield a blue coloration with iodine.

The iodine reaction with a starch is extremely sensitive. It is estimated that one pound of starch distributed uniformly over 55,000 square yards of average weight cloth can be detected. Since the iodine test is not specific and is so sensitive, unless intelligently conducted, erroneous conclusions may be drawn.

While my talk this evening has been rather disorganized, I trust that it has served to illustrate some of the more important uses of Rapidase in the processing of textiles.

Chairman Kingsbury: I want to thank Mr. Gale for this talk. If there are any questions I am sure he will be glad to answer them.

If there are no questions we will pass on to our next speaker, B. H. Little of the Naval Stores Department of the Hercules Powder Company, whose subject is, "Pine Oils." Mr. Little! (applause).

H. B. Little: The subject of "Pine Oils" is rather broad so with your permission I am going to modify it just a little bit and speak rather about "Hercules Yarmor Pine Oil, Some Observations of Its Uses by the Textile Industry."

Hercules Yarmor Pine Oil

By B. H. LITTLE

Hercules Powder Company

THE production of steam distilled pine oil is approximately 2,700,000 gallons yearly in the United States. The production of all other countries is practically negligible.

Yarmor Pine Oil is a quality product of the so-called Steam Distilled class.

The specifications of Yarmor Pine Oil are as follows:

	Max.	Min.
Specific Gravity at 15.5°C.	0.942	0.937
Refractive Index		1.480
Unpolymerized Residue	2.5%	
Moisture	0.5%	
Color:		
500 Amber	12.0	
200 Red	0.5	
Acidity as Acetic Acid	0.1%	
Odor	Characteristic	
Appearance	Clear and free from suspended matter	
Boiling Range: :		
5%		203°C.
95%	235°C.	
Caustic Test	Negative	
Flash Point		70°C.

These specification are explained as follows:

Gravity limits denote uniformity and purity.

Refractive Index means absence of resin acids and other impurities.

Unpolymerized Residue insures complete freedom from solvent used in extraction.

Color shows it will not stain in textile work.

Acidity shows freedom from acid substances.

Characteristic Odor insures against high temperature decomposition to form empyreumatic bodies.

Appearance—self-explanatory.

Boiling Range indicates uniformity and proper separation from turpentine.

Caustic Test insures against discoloration in the textile bath.

Flash Point advises relative safety in handling.

Moisture Content permits dilution with petroleum hydrocarbons without clouding or precipitation.

Yarmor pine oil is composed of:

Terpinene	B.P. 180° C.
Fenchyl Alcohol	202 to 203
Terpineols	204 to 210
Ketones	210 to 212
Borneol	211
Alpha Terpineol	218

Other terpene derivatives occur in small quantities.

Yarmor pine oil should not be confused with the very small quantities of pine oil made from pine needles and used in the drug trade, or the sizeable quantity of pine oil which is a heavy cut from the oils produced by the destructive distillation of pine wood, with widely different characteristics from the steam distilled product.

Yarmor pine oil has a wide variety of applications in the industries. Its greatest use is for producing froth in the separation of metals from the gangue. Its high phenol co-efficient of 4.7 to 5.0 makes it useful as a disinfectant. Also, it is used as a deodorant.

It is a practical source of alpha terpineol, borneol, fenchyl alcohol, terpine hydrate, etc. Its use in the textile industry is making rapid progress.

Horsfall and Lawrie[1] have made an excellent classification of the characteristics which a desirable auxiliary compound as soluble pine oil for use in the wet processing of textiles should have. The classification by these workers is given with a brief remark.

1. *Non-Injurious to Fibre.* Upon determining the effect of pine oil upon fibres using as our criteria "Tensile Strength" to find out if pine oil is injurious, viscose was chosen for the tests because it is representative of the tender fibres. Extensive tests were made, the conclusion of which is that Yarmor pine oil has no tendering action or apparently detrimental action upon viscose in the presence of a pine oil soap at 150° F. for a period of thirty minutes, which is the ordinary temperature and time required for de-oiling rayon. These results were published in "The Melliand." Volume I, Nos. 1 and 2, 1929.

2. *Protective Agent.* Most protective agents are colloids typical of which are sulphite-cellulose-lacquer and compounds of the general strength and nature of taurocholic acid. No explanation has been made as to how these substances function. We do know that acid or alkaline ions have a tendency to concentrate at the surface of the fibre. It is thought that these substances prevent these concentrations; other explanations are based on the electrical charge introduced by these colloids. It has been observed that the presence of a pine oil emulsion in an acid or alkaline bath has a tendency to prevent this phenomenon.

[1] Horsfall and Lawrie—The Dyeing of Textile Fibres; pp. 349-356; D. Van Nostrand and Co., New York City, 1929.

3. *Dispersing Agent.* Numerous dyestuffs exist colloidally. Many of them are of relatively low solubility. Better penetration is usually obtained by the addition of a dispersing agent to the dye bath. Soluble pine oil not only increases the penetration but has a tendency to insure the proper depth of shade. This good result is particularly noticed when used in connection with vat dyes.

4. *Wetting Out Agent.* Usually the addition of these agents to the dye liquor, scouring liquor or kier liquor causes the textile material to be more quickly wetted. The use of soap alone often results in serious difficulties. Soaps form sticky, insoluble lime and magnesium soaps when used in hard water. The insoluble lime and magnesium soaps oftentimes can only be removed from the piece goods by means of spotting, which is a slow and very expensive operation. Investigation shows that soluble pine oil minimizes the precipitation of calcium or magnesium soaps. It is observed that when pine oil is used with sulphonated castor oil in the bath that the detergent function of the sulphonated oil is increased apparently due to the action of the pine oil.

The Solvent Action

Numerous organic solvents are being used to obtain greater efficiency of the scouring, washing, boiling and other cleaning operations on textiles. Some are used with other agents as Turkey red oil. In considering these organic solvents, H. R. Davies[2] has the following interesting comments to make: "It is easy to see, of course, that the thorough and complete wetting out of the material which has to be later dyed and bleached is essential. Practically all of the fibres used in the textile industries are contaminated in some way with material of one sort or another which hinders or prevents its immediate and thorough saturation with water. There is a natural grease, for instance, in the wool fibres; the wax and pectic matter contained in cotton; the sericin and gum present in large quantities in raw silk; and, in addition, when fabricated yarns or piece goods are considered, the spinning oils and various sizes which are used in their manufacture. In order, therefore, to have clean and workable stock, it is essential that the detergent material used will be one which will penetrate to the ultimate heart of the individual fibres if good, level, perfectly penetrated dyeings are to be produced."

Mr. Davies expresses himself to the effect that the function of these materials is not so much as a solvent but rather as a detergent. Soluble pine oil has unquestioned detergent properties due to its reduction of surface and interfacial tensions. For instance, good scouring is highly dependent on the wetting out and penetration of the material. This can only be accomplished to a large extent by the reduction of surface tension of the scouring medium and of the interfacial tension between materials to be scoured and the scouring medium. The colloidal system should be sufficiently stable to carry dispersed and resist substances removed from the goods. It is upon this fundamental basis that Yarmor pine oil is proving of material aid, as an assistant to the scouring and boiling out operations.

The object of using soluble pine oil as a component of the kier formula is to accelerate the wetting out of the cotton, to act as a lubricant and, therefore, to increase the circulation of the liquor through the goods and to assist in the emulsification of the fatty and waxy products and oils in the cotton. The soluble pine oil in the kier formula provides a very stable emulsion which has a marked tendency to hold in suspension the lime soaps as well as the foreign materials removed from the fibres. These factors make possible an efficient rinse which is vitally necessary to obtain good "boiling out."

In general, the use of soluble pine oil in the kier has proved advantageous where quality results are desired, on difficult work and on poor grades of cotton which contain foreign matter necessary to be removed. Aside from these advantages, it has been found that the time of boiling may be reduced one-fourth to one-third.

The wetting efficiency of Yarmor pine oil combined with sulphonated castor oil or soap is fundamental to its use in all of the scouring or boiling off processes, particularly so to the scouring of greasy substances from the goods. Soluble pine oil, when used in conjunction with scouring agents, due to its emulsifying properties, holds these oils in suspension and exerts a great efficiency in emulsifying these oils from the goods. Soluble pine oil has rendered maximum performance under the most exacting conditions, especially when an excellent bottom for the subsequent bleaching and dyeing operations is necessary. The detergent properties of soluble pine oil, when used in the scouring process, are obtained at low temperatures which are sometimes necessary during this operation. Our investigation has developed that Yarmor pine oil is among the best emulsifying agents and that a mixture of pine oil and soap is much superior to any single emulsifying agent. The pine oil formulae for scouring oils from materials as rayon, have shown that 100% mineral oil or mixtures of mineral oil and saponifiable oils may be removed with no effect on the strength of the rayon. The outstanding advantages of soluble pine oil for the de-oiling of rayon fabrics are, the nearly complete removal of oil in one bath; the possibility of using cheaper and more satisfactory mineral oils as rayon lubricants; the absence of alkali which has a tendency to injure rayon.

Yarmor pine oil is being used in increasing quantities by the mercerizers of skein goods. The pine oil is incorporated in the mercerizing liquor. Visual and microscopic inspections of the finished yarn show a whiter yarn and one with fewer projecting fibres than the yarn mer-

[2] H. R. Davies—A Proposed Method of Testing the New Wetting Out Materials; Amer. Dyestuff Reporter, V. 16, No. 19, pp. 719-723, Nov., 1927.

cerized in the usual manner. The luster obtained is as good. The dyeing tests conducted on knitted materials show considerably more evenness. In the case of dark shades heavier and more even dyeings are obtained in a shorter space of time. In either case the dyed yarns were not perfectly even but the pine oil-alkali mercerized yarn was superior to the ordinary one. Mercerizing with pine oil in the alkali liquor decreases the count; that is, increases the weight which results in considerable saving.

The use of soap and pine oil for degumming of silks effects several advantages. While the use of soap and pine oil for degumming is not as effective as soap and borax by a small percentage, the danger of damage of fine silk fabrics is eliminated. The advantages of using pine oil for silk degumming are: the better removing of the gum, absence of alkali which has a tendency to injure silk, lower costs due to replacement of a large percentage of soap with a small percentage of pine oil.

Soluble pine oil when used in the dye bath provides penetration and leveling of shades. Our experiments testing soluble pine oil as an assistant to direct cotton dyes show that the dyes will go on cotton evenly under almost any conditions and level results will be obtained, if the process is given sufficient time. Not all of such processes are under ideal control and many dyers have been insured against poor results by using soluble pine oil as an assistant when dyeing direct cotton dyes. The advantageous results are particularly pronounced when used as an assistant in the dyeing of cloth in a padding machine and in circulating dyeing machines. This is particularly true in the padding machine as the presence of pine oil causes the necessary wetting out and penetration.

Our results in using soluble pine oil in connection with basic dyes indicate that without a doubt better penetration is obtained when soluble pine oil is used. In this connection with darker dyes where the textile material is open and circulation is free there appears to be no particular advantage in using soluble pine oil. Where the material has been sewed, the use of soluble pine oil provides the necessary penetration in seams, and where the material is packed tightly.

Soluble pine oil is equivalent to and better than most products when used to condition acetate rayon or celanese preparatory to its dyeing. It has proved to be an excellent scouring agent. It wets out the material sufficiently so that when the material is processed in the dye bath excellent levelling is obtained. In this connection, pine oil has proved to be equal to Turkey red oil as a dispersing agent for S.R.A. dyes.

Results show that when using soluble pine oil to assist in dyeing with Indigosols that a more rapid wetting out is obtained. With Indigosol O.R. heavier dyeings are produced with soluble pine oil than is the case where Turkey red oil is used.

Results are practically the same when using soluble pine oil as an assistant to sulphate dyes as mentioned with direct cotton dyes. Soluble pine oil, used as an assistant for Napthol AS dyes, provides a more rapid wetting out, being of desired advantage in padding and printing.

Soluble pine oil has given excellent results when incorporated in dye liquor in the Franklin Process machine, being of particular advantage when sulphur dyes are used in this process.

Our best results have been obtained by co-operating with the textile chemical manufacturers or the technical staffs of the various mills to determine just what type of soap and in what proportion Yarmor pine oil should be blended to give the desired results. This has been and is necessary due to the fact that the innumerable detergent problems confronting the operator are different in each case, being dependent on the type of goods, temperatures, time of boiling or scouring, etc.

In conclusion, we have discussed the fundamental uses of Hercules Yarmor pine oil by the textile operator. It is not within the scope of this paper to go into the many details possible. The uses set forth are the bases of the efforts of the Hercules Powder Company to reduce the textile operators' difficulties in the wet processes for the scouring of rayon, boiling off of cotton, obtaining better leveling in the dye baths, degumming of silk and mercerization of skein goods. The method of production of Hercules Yarmor pine oil makes it possible for the textile industry to obtain a quality product most suitable for their use. The uniformity and physical and chemical characteristics of this product insure a maximum performance, especially when processing poorly prepared materials.

Discussion

Chairman Kingsbury: Thank you, Mr. Little, for this paper. I am sure Mr. Little will be glad to answer questions if you have any.

Mr. Gale: I wonder if you have made any tests to determine the quantity of pine oil that can be carried by a dilute oleate soap solution? What I am interested in is your part that refers to degumming of silk. Of course a very weak soap solution won't carry much pine oil.

Mr. Little: You are primarily interested, I take it, in the amount of pine oil that can be incorporated in oleate soap in degumming of silks. We have not tested pine oil in that connection. Our test in using pine oil in connection with soap for the degumming of silks has been based on an olive oil soap.

Mr. Gale: I see.

Mr. Hirsch: Perhaps I can answer that, Mr. Little.

I know of soap oleates containing as much as 40 per cent of pine oil and 60 per cent of oleate.

Mr. Gale: When that is diluted with water, though, will the pine oil stay in it?

Mr. Hirsch: It probably will.

Mr. Little, I would like to ask you a question. You said

that the use of pine oil compounds will assist the penetration and wetting out in the mercerizing of cotton. Can you tell me what form of pine oil compounds are used there? Naturally, it would be a form which would not separate because of the concentrated alkali in a caustic soda solution.

Mr. Little: On our first test using pine oil as a wetting out material in the mercerization of cotton goods, the pine oil itself was paddled into the bottle. We have, however, in some cases been able to combine the pine oil with a small amount of a high titer soap. That has withstood the concentration of the alkaline bath.

To assume that that could be applied in all mercerizing baths would be incorrect. The whole thing depends entirely on the individual process as to whether that is possible but in most cases it has been extremely difficult to compound pine oil with a soap so that it would withstand the concentration of the alkali in the bath.

Mr. Hirsch: One other question: I noticed in your analysis that one of the constituents is Terpineol. There is a company that has been selling Terpineol that has represented that as the active constituent of pine oil and they have made the claim that you could get more economical results by simply buying the Terpineol instead of the Pine Oil. Perhaps you might comment on that.

Mr. Little: There is no doubt that Alpha Terpineol contributes largely to the efficiency of the Pine Oil, particularly in its characteristic ability to reduce surface and interfacial tensions. However, Fenchyl Alcohol plays a very important part and some of the Borneols also play an important part. We have in numberless tests, using Pine Oil as a detergent not only for textile uses but for other uses, found that we have gotten better results from the straight Pine Oil than we have from either one of the constituents mentioned.

Just what the scientific basis of those results is I don't know. It is just a matter of trial and error and taking the best results as indicative of the proper materials to use. In that case it was Pine Oil.

The French incidentally have done some work on that point and have endeavored to point out that Alpha Terpineol, incorporated in kiers, where kiering is done, at high temperature and pressure, is superior to Pine Oil. Their results however do not appear to show a conclusive result.

Dr. Harold: I should like to ask the speaker or perhaps Mr. Hirsch might know where the soap can be secured. Does he know of any marketable soap containing say 40 or 50 per cent of Pine Oil in a fine suspension?

Mr. Hirsch: I think there are a number of companies that make such a soap. My company makes a soap of that sort.

Dr. Harold: What company is that?

Mr. Hirsch: B. P. Ducas Co. But I think there are a number of other companies.

Dr. Harold: They make that?

Mr. Hirsch: Yes. We purchase the Pine Oil from the Hercules people.

Mr. Herrmann: Mr. Little, is there any complication to combining or emulsifying Pine Oil with a soap? Would it be possible for the ordinary dyer to carry that out?

Mr. Little: Your remark brings to my mind several amusing situations I ran into in the Southern mills.

There is some difficulty, yes, with the average dyer in attempting to blend Pine Oil with a soap or a sulphonated castor oil because the average dyer is not familiar with the physico-chemical relationships involved to know just what the optimum amounts are that should be combined. Oftentimes a soap containing an excessive amount of water instead of taking the Pine Oil has a tendency to cause an emulsion of the Pine Oil before proper blending of Pine Oil and soap.

Of course it is a question as to whether that is a decidedly negative factor. In some cases it is and in some cases it won't be.

I found in some of the mills, for instance, that the instruction from the superintendent was to put a dipper full of this material in the bath and sometimes the operator would put two dippers full in to speed up the results, not thinking of what he was doing. That is what it means. So we for that reason have felt that it was more logical to cooperate with companies that are legitimate producers of specialty compounds as they have the experience in blending those materials and can put out a product that will be more foolproof and produce better results than we would get by carrying the Pine Oil direct to the mill.

Mr. Herrmann: In working with an emulsion of this character some time ago I found that, rather against all anticipation and belief, it seemed to wet out material like cotton warps just about as well as ordinary temperature as at a hot temperature. I was wondering whether that was a general observation or just a peculiarity of the particular location, or possibly the imperfect emulsion that had been made. It did its work well and we noticed in preparing a beaker of this liquid and just floating cotton material on top of it that the cotton would be absorbed by the liquid at normal temperature—I don't recall the time, I think it was in something like 5 or 6 minutes. It did it just as fast cold as it did at 160 or 180, say.

Mr. Little: We have noted the same results that you just mentioned.

Mr. Hirsch: Mr. Little, have you made any attempt to remove soot from, say, knit goods? Do they have a great deal of trouble with that in some parts of the South where they use soft coal exclusively? Have you tried out Pine Oil in that connection?

Mr. Little: We have not so far as I know made any experiments along that line. Do you know, Mr. Rapp, of any work in that connection?

Mr. Rapp: Nothing up to date.

Mr. Herrmann: In mixing these compounds of various soaps or oils, does the size of the particle in emulsion have anything to do with the lowering of surface tension? In other words I suppose that one type of soap oil might make the product more soluble than another. Would the size of the particle in any way affect the lowering of surface tension? I mean, do some soaps produce better than oils? Or what has been your experience?

Mr. Little: We have found that blending Pine Oil with low titer soaps has given us better penetration and wetting out.

I might add that we are right now in the midst of research to determine among several points one that you brought up specifically with regard to particle size in direct ratio to the speed of wetting out. We are testing the high titer soaps as well as the low titer soaps but our practical observations point to better results from the use of the low titer soap which incidentally makes it easier for the textile manufacturer to compound the soap.

Mr. Gale: I take it that low titer soap will carry a higher proportion of Pine Oil than a high titer.

Mr. Little: Yes, in most cases. When Pine Oil is used with a high titer soap we have a higher amount of sweating out, syneresis, observed quite markedly; on aging over a period of six months you will find that the Pine Oil has a tendency to move in zones through to the surface and to be lost by evaporation.

Mr. Herrmann: The reason I ask that question is because I have been experimenting with Pine Oil in the past year and within the last few months I was able to create an oil that carried about 50 per cent of Pine Oil and the remarkable thing was instead of getting an emulsion I got a clear solution, and I just wondered. That is the reason I asked that question whether if you dissolved the Pine Oil to as small a particle as possible you would get better wetting out or better penetration.

Mr. Little: It seems to me as a matter of fundamentals that there is an optimum particle size there that we should try to get. We know in bacteriology that particle size has a good deal to do with the efficiency of the activating material that disinfects. In other words the smaller the particle size the quicker you can get through openings, to put it in that way.

We believe that there is valuable data we should have on that point. As I said a while ago we are attempting to work that out now. When we do we will be glad to advise you of our results.

Mr. Wolfson: I think I can add something to this discussion.

We have done some work on that and we find that the particle size has a whole lot to do with the wetting out. Where the particle size is small, and you get a solution, you get much better wetting out than where you have an emulsion.

Chairman Kingsbury: If there are no further questions I declare the meeting adjourned.

The meeting thereupon adjourned at nine-thirty o'clock.

Applicants for Membership

Active Membership

Diener, Walter M., superintendent of dyeing and bleaching, Spring City Bleach & Dye Works, Spring City, Pa. Sponsors: E. C. Knaeble and A. M. Burt.

Duncan, James R., colorist, Clearwater Mfg. Co., Clearwater, S. C. Sponsors: James W. Entwistle and Alex. Morrison.

Gherardi, Mario, directeur chimiste, Imprimerie Marrom's, Torre Pellice (Torio) Italie. Sponsors: Alex. Morrison and Walter Sullivan.

Johnson, B. S., superintendent, Read Hosiery Mills, McMinville, Tenn. Sponsors: Robert Cowan and G. H. Dubois.

Nuttall, R. H., superintendent, Clearwater Mfg. Co., Clearwater, S. C. Sponsors: James W. Entwistle and Alex. Morrison.

O'Byrne, Thomas, color shop, Clearwater Mfg. Co., Clearwater, S. C. Sponsors: James W. Entwistle and Alex. Morrison.

Otto, Paul M., chemist, Botany Worsted Mills, Passaic, N. J. Sponsors: E. H. Killheffer and Giles Low.

Partington, Edward J., dyer, Guyan Mills, Valley Falls, R. I. Sponsors: H. J. Stulz and F. M. Bonnett.

Sledge, W. T., dyer, Miller Smith Hosiery, Chattanooga, Tenn. Sponsors: L. R. Hiller and R. S. Wheeler.

Winnell, Lloyd H., salesman, National Aniline & Chemical Co., 40 Rector St., New York, N. Y. Sponsors: Wm. R. Moorhouse and Chas. C. Knights.

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Lipschitz, Louis, student, Bradford Durfee Textile School, Fall River, Mass. Sponsors: C. Nelson Alderman and Isaac Lovit.

Stacey, Alfred C., chemist, American Woolen Company, Washington Mills, Lawrence, Mass. Sponsors: Henry D. Grimes and L. A. Olney.

A New-Type Rayon Oil

A great deal of the difficulty encountered in the processing of rayon yarns, whether fabrics are to be woven or knitted, undoubtedly results from the necessity of using some sort of an oil to lubricate the fibers.

Among these difficulties might be mentioned the corrosion of knitting needles with resultant roughening and breakage of yarn; discoloration of yarn and fabric; the development of offensive odors after only a short time of storing; loss of weight in drying and uncontrollable take-up.

The principal requirements of a suitable rayon oil might be summarized as follows:

1. The ideal oil must be neutral in reaction
2. It must be resistant to rancidity.
3. It must be resistant to oxidation
4. It must be of low viscosity
5. It must have a low moisture content
6. It must be highly emulsifiable
7. It must not injure or weaken the rayon upon storing.

When oils absorb oxygen from the air three changes gradually take place: (a) The treated rayon becomes discolored; (b) The rayon yarn becomes gummy, making further processing difficult and unsatisfactory; (c) An offensive odor develops. Therefore, it may be said that resistance to oxidation is perhaps the most important single requirement in a good rayon oil.

The research chemists of National Oil Products Company of Harrison, N. J., have evolved a product which is marketed under the name of Textoyl No. 1556, which they claim meets all of the difficulties enumerated above. They report that this product is non-corrosive and that even after long contact, no needles or other parts of machines are affected in the slightest degree, with the result that there is no roughening or breakage of the yarn. They have also given yarn processed with this product long-time storage tests and report that no disagreeable odor results and no tendency on the part of the oil to become rancid appears.

Among the tests used to determine the characteristics of this product were the following:

To determine the liability to rancidity, a simple test was used which anyone interested in rayon manufacturing can readily repeat for himself. Pieces of knitted and woven rayon fabrics were heavily oiled, then sealed in ordinary Mason jars. The jars were stored in a warm room for a period of several weeks. Upon examination, no objectionable odor was found.

In testing for oxidation the oil was first analyzed for acidity, iodine value, viscosity and color. Bubbles of air were then run through a sample for several hours, whereupon it was again tested and examined so that any changes could be noted. No appreciable change was observed, indicating that it is practically proof against oxidation.

When tested for viscosity on a Saybolt standard viscosimeter at 100 degrees F., the viscosity was found to be 120 seconds.

Although it is necessary to use oils in processing rayon, it is equally imperative that the oil must be fully removed if the goods are to be properly dyed and finished. For this reason, it is highly important that the oil should be readily emulsifiable so that it will scour out easily without excessive use of cleansers. According to the manufacturers, their new product is thoroughly emulsified and may be completely rinsed out of all textile fabrics with a light scour in warm water alone, although the use of a little mild soap is recommended.

Annual Buddy Poppy Sale

Approximately 50,000 poppies are being made each week by the disabled ex-service men patients in U. S. Veterans' Hospitals throughout the country in preparation for the annual Buddy Poppy Sale of the Veterans of Foreign Wars, according to Captain Robert B. Handy, Jr., National Poppy Chairman of the organization.

"All the Buddy Poppies used in our national sale, held each year during the week of Memorial Day, are made by disabled and needy ex-service men," said Captain Handy. "The Veterans of Foreign Wars inaugurated this method of manufacture six years ago with the cooperation of the United States Veterans' Bureau, and the local Veterans' Hospitals are only two of a number of government hospitals throughout the country in which the Buddy Poppies are made each year.

"'Buddy Poppy' is the name chosen by the men themselves and each flower carries a copyrighted label which guarantees it to the public. The entire proceeds of the sale, which last spring reached a national total of approximately 6,000,000, are devoted to welfare and relief work for ex-service men and their families, including an allotment to our National Home for Widows and Orphans of Ex-Service Men."

The White House has annually endorsed the sale. It is also endorsed by the General Federation of Women's Clubs and by state federations, William Green, President of the American Federation of Labor, fraternal organizations, religious leaders and business and professional associations.

Frank Love, a graduate of the Textile School of North Carolina State College, has recently accepted a position with the Keystone Finishing Mills, Burlington, N. C., and will be in charge of dyeing. Mr. Love was formerly with the Neisler Mills, Kings Mountain.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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ACROSS THE SEA

WHEN England was faced with the possibility of having her domestic dye industry trodden under foot by foreign competition, she immediately looked about to discover what particular measures might be employed to save her own trade. This developed in 1920 in the passage of a bill called the "Dyestuffs Act" which provided that up to January, 1931, there could be no importation of dyestuffs into Britain unless sanctioned by governmental license.

This plan worked out successfully, and in a relatively short while the dyestuff industry within England's shores was standing very staunchly on its own. In the production of vat colors alone, according to the figures released by the Board of Trade, there has been a very marked increase; in 1929 the total production of vat colors was more than twenty-four thousand tons, a figure a little bit better than double the total of five years before. So it has been in the other fields in the industry, generally speaking; a constant and continual building up has gone on so that to-day England is able to produce by weight ninety-two per cent, and by value seventy-three per cent, of all the dyes consumed in that country.

Naturally, this development has not been overlooked by Continental Europe. It has seemed logical to certain dye manufacturers there to try to interest the British producers in the International Dye Cartel—this with an implied rationing of production among the Cartel's members and a more or less dividing up of the consuming territories. However, although the offers were most attractive from a financial standpoint, they have not received very serious consideration. This may be attributed largely to the belief that were such a Cartel union effective the result for England would be a slowing up of domestic industry, and a consequent curtailment of production, and necessarily, of employment. England surely cannot afford to do anything further to diminish the number of her workers employed.

The trade history of Great Britain has been one of gradual expansion, stimulated on occasion, of course, by emergency, but through the years making rather unhurried progress towards a definite goal. This has been true of British financial growth as well. In neither department of activity is it reasonable to expect that gains which have been so successfully realized will knowingly be lost. England will maintain and develop this newly vitalized dye industry, and undoubtedly will continue in her own way, no matter how alluring foreign offers may be. The lessons taught by the Great War in this respect are far from being forgotten. English dye-makers naturally will desire to continue research along all lines which they consider important—research and profitable production.

Development of the dye industry in the United States has in many respects paralleled, and in some respects exceeded Britain's remarkable record. In our own case certainly this has been accomplished without undue interference with foreign producers or working any essential harm to them, as our imports statistics clearly show. What has been gained in the United States, as well as in England, is the realization of measurable independence in a nationally vital industry.

A MANAGEMENT DECALOGUE

SMOOTH and efficient running of industrial organizations should be the more possible of attainment through consideration of suggestions made at the Annual Spring Convention of the American Management Association in New York this month. The suggestions offered for study by the various speakers have, as a rule, a tested background and can be taken as practical contributions to the science of management.

Outstanding among the talks at the Convention was an address by Colonel Malcolm C. Rorty, Vice-President of the International Telephone and Telegraph Corporation. Colonel Rorty is no mere hander-out of praise; he analyses many situations keenly, as well as constructively, showing where dangers can be avoided so that success may be obtained.

The gist of his remarks may be summed up in ten rules of good organization given by him, as follows:

1. Definite and clean-cut responsibilities should be assigned to each executive.
2. Responsibility should always be coupled with corresponding authority.
3. No change should be made in the scope of responsibilities of a position without a definite understanding to that effect on the part of all persons concerned.
4. No officer or employe occupying a single position in the organization should be subject to definite orders from more than one source.
5. Orders should never be given to subordinates over the head of a responsible officer. Rather than do this the officer in question should be supplanted.

6. Criticisms of subordinates should, whenever possible, be made privately, and in no case should a subordinate be criticised in the presence of officers or employes of equal or lower rank.
7. No dispute or difference between officers or employes as to authority or responsibilities should be considered too trivial for prompt and careful adjudication.
8. Promotions, wage changes, and disciplinary action should always be approved by the officer immediately superior to the one directly responsible.
9. No officer or employe should ever be required, or expected, to be at the same time an assistant to, and critic of, another.
10. Any officer whose work is subject to regular inspection, should, whenever practicable, receive the assistance and facilities necessary to enable him to maintain an independent check on the quality of his work.

Much in these rules is related to what may be called management detail, important in itself and worthy of careful thought. But running through them all is a fine sense of responsibility, with clear indication of common-sense ways of emphasizing it.

Random Thoughts on Research

A New Fiber and the Textile Industry

LET us go a little further with the idea that any new and better fiber that we have not yet discovered or invented can come into use in a large way only by replacing present-day fibers. The only ways to add large quantities of any new fiber to our consumption are through the natural increase in population, through making new clothing so cheap and attractive that we will all carry larger wardrobes, and by using large quantities of cloth (or yarn) for things that we have not yet thought of.

It is of no interest to the present textile man to try to invent new fibers with which to compete with himself. The alluring prospect of new and wonderful things in research might look like a negative virtue.

An individual corporation might enjoy such a new fiber and might use it to very good advantage. If it were available to the whole trade it would of course find many uses, but there is no great positive incentive to try to devise new fibers.

There is, however, another side to this question which should be of more interest. Nowadays, there is plenty of money for any new enterprise that looks good, and with the scientific and technical talent available, it is easy enough for anyone outside the present textile industry to get interested in such a research project as a quest for a new and stronger artificial or synthetic fiber. Once let some university or independent research unit get a good lead on such a project and there would be little difficulty in floating a new business to break into textiles. Let us emphasize that such a thing is perfectly possible and may happen. (If you do not think so, where is your faith in textile research?) If I could suggest just how it might happen, I would not make the idea public, but it is within the reasonable expectations of chemical science. Would it not be plain business common sense for the present textile interests to have some continuous fundamental research going on along this line? It certainly would.

There should be a constant literature check to cover patents or scientific papers with any leaning in this direction, as well as actual constructive research. Any such development might be anticipated (in the patent sense) and the industry would be in a far better position to take advantage of such discoveries, whatever their origin.

The probability that any *existing* natural fiber will ever be discovered which will make serious inroads on our ordinary textiles is rather remote, in spite of occasional press-agenting and enthusiasm over some new idea, which usually proves to be a *re*-discovery, if not a complete false alarm.

The above paragraph does not refer to the distant future when the earth may become overrun with people and when the cotton supply may be found to dwindle because the land would be needed for food. Then we would have to resort to such processes as cottonizing seed flax straw and hemp, assuming that land can then be spared for flax for linseed oil, and so on. We could go on indefinitely but probably by the time that this all might happen we will be depending on forest lands where food cannot be grown, for much better synthetic fibers than we now have. (Research is going to become very *necessary* at some future time.)

Coming back to the immediate future, we can hardly expect that the crossing or scientific breeding of fibers will bring about any great or sudden change in our fiber habits, but all such work should be watched and promoted to a reasonable extent if only for the gradual improvements that ordinarily result.

To back up this idea, if it needs it, we have the well-known facts that all the various synthetic fibers were invented by chemists and are manufactured by chemical companies, and that their production came about (I think it is fair to say) entirely outside the textile industry. Fortunately the textile interests were able to take advantage of the opportunity in rayon and have done more than its manufacturers to make it successful in use.

The coated fabric, with its myriads of uses, is another textile development by chemical companies largely outside the regular textile industry.

Swiss Dye Exports to U. S. Greater

According to a report received from Consul Calvin M. Hitch, the exports of aniline dyes from Basle to the United States showed during 1929 an increase of approximately 48 per cent over that of the preceding year. His figures show that $2,034,010 worth was shipped to this country last year as compared with $1,367,630 in 1928. The reason attributed by the Basle exporters for this expansion was the increased demands of the silk trade to which exports have been almost exclusively confined of late.

Kier Bleaching Cotton Goods with Hydrogen Peroxide

By **H. G. SMOLENS**

Consulting Engineer, Buffalo Electro-Chemical Co., Inc.

THERE seems to be a widespread opinion among cotton bleachers that steel kiers which circulate and heat liquor by means of a steam jet of any type, are altogether unsuitable for Hydrogen Peroxide bleach boiling.

This is now entirely erroneous.

Almost any kier that gives a good level boil on cotton goods with the ordinary kier boiling solution, will usually give a good level bleach boil with the proper alkaline peroxide solution. This refers to pump kiers with either direct or indirect heating elements, to center vomit kiers and to outside vomit kiers. It also includes the injector kiers, of either the tank or inspirator type, in which there is a timing device allowing an intermittent admission of steam into the circulating system, producing thereby an intermittent circulation of the kier liquor.

In fact, it is possible that the intermittent circulating kier is the most economical one for peroxide bleach boiling, as it may be operated successfully with the shortest liquor. This allows a greater concentration of the peroxide bleaching chemicals, producing a better bleach for any given percentage of these chemicals, or, it allows a reduction in the quantity of the peroxide bleaching chemicals for a given whiteness, thereby reducing the costs, sometimes considerably.

Of course, in the operation of such a kier for peroxide bleaching, it is important that the alkaline peroxide liquor be prepared correctly and that the kier be brought to a boil properly. But, this is just as true of any type of kier.

Another prevalent opinion among cotton bleachers, who have been at all acquainted with peroxides or peroxide bleaching, is that an alkaline peroxide bleach solution must not be boiled, especially in steel kiers.

This is also erroneous now.

It is possible to get cotton goods white at 160° F. to 180° F., with an alkaline peroxide solution containing a comparatively large amount of Hydrogen Peroxide, but the dyeing and finishing of such goods are usually difficult. Also, the bleaching cost is higher than it should be.

It is almost fully established now, that, to obtain a proper and economical bottom on cotton goods for dyeing, printing, etc., in a peroxide bleach kier boil, the circulating liquor must actually be boiled for at least four hours.

However, a boiling peroxide bleaching kier liquor, to be economically effective, must contain a hydrogen peroxide that is extremely stable in such a solution. It must also contain alkalies, especially caustic soda, in sufficient quantities to allow the hydrogen peroxide to continue to bleach as long as there is any left in the kier liquor.

Although a boiling peroxide bleach solution, circulating through a kier load of cotton goods, will always lose some of its available bleaching strength by decomposition of the Hydrogen Peroxide, it must retain an appreciable effectiveness as long as there is bleachable cotton present. Otherwise the kier bleach is not right.

The following curves show very strikingly how the same Hydrogen Peroxide bleach solution will behave, in similar kiers, in which have been put lots of the same cloth prepared under somewhat different conditions. Three ton, 8′ 0″ x 10′ 0″ steel kiers were used, each with about the same quality and quantity of cloth, plaited in by one man. The circulation and heating were obtained by means of direct high pressure steam admitted through two inspirators, one of which took the liquor from the draw off pipe, up an outside riser and sprayed it over the top of the goods; the other of which, located under the grate, took liquor from the well, up a perforated pipe and forced it into the center of the mass of goods. Both of these inspirators were connected to the same steam timing device which made them throw the bleach liquor intermittently, but simultaneously.

KIER No. 1. 6 bales of 8 oz. duck; 3 bales of 2 yd. twill; 3 bales of 10½ oz. duck.

The cloth was run from the grey room in rope form through cold water, given one nip, then piled in the kier. A charge consisting of fifteen pounds of silicate of soda and thirty pounds of flake caustic was made up and run into the kier. The steam was turned on, the kier rapidly brought to a boil without pressure and boiled without pressure for two hours. The liquor was then dropped and the cloth washed down for about half an hour. Another charge consisting of 225 lbs. of silicate of soda, 36 lbs. of flake caustic

soda, 20 lbs. soluble castor oil and 210 lbs. Hydrogen Peroxide, 100 vol., was made up and run into the kier. The kier was then boiled without pressure. (See curves.) After the boil, the cloth was removed from the kier through two fourteen-strand washers and examined. The entire lot of twill was a very good white and perfectly level throughout. The two lots of duck were uneven, that is, where the bleach liquor had reached and penetrated the cloth, it was thoroughly bleached; where the bleach liquor had not penetrated the cloth, especially in the creases, it was unbleached. The ducks were returned to the kier for a second boil of three hours and were then O. K.

KIER No. 2. 6 bales of 10¼ oz. duck; 4 bales of 8 oz. duck.

The cloth was run from the grey room in rope form, through an eight-strand washer containing fifteen pounds of silicate of soda and sixty pounds of caustic soda, given one nip, then piled in a bin and steeped overnight. Fom this bin the cloth was run through a fourteen-strand washer into the kier. Exactly the same charge of bleaching chemicals as in Kier No. 1 was made up and run into this kier, and it was boiled in a similar manner. (See curves.) After the boil, the cloth was removed from the kier through two fourteen-strand washers and examined. The 8 oz. duck was a very good white and level throughout. The 10¼ oz. duck was similar in appearance to that of Kier No. 1, but there were less unbleached places.

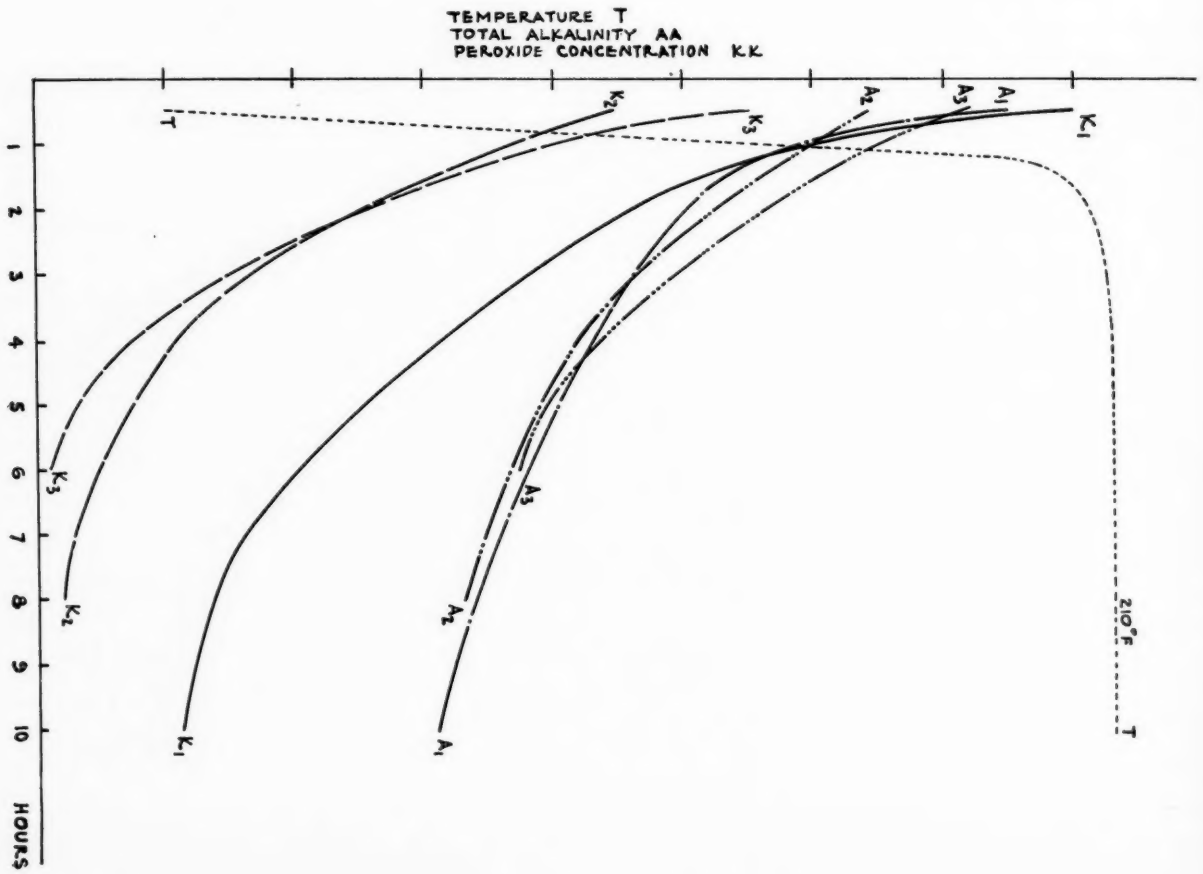
KIER No. 3. 6 bales of 10¼ oz. duck; 4 bales of 8 oz. duck.

The cloth was prepared in a similar manner as for Kier No. 2, but was allowed to steep only four hours. It was then kier bleach boiled with the same charge of bleaching chemicals and in a similar manner to Kier No. 2. However, instead of the soluble castor oil, a soluble pine oil was used. (See curves.) After the boil, the cloth was removed from the kier through two fourteen-strand washers and examined. The 8 oz. duck was a very good white and level throughout. The 10¼ oz. duck was similar in appearance to that of Kier No. 2, but some of the creases were almost dry, that is, they had not been wet out at all in all of the above processing.

The two lots of 10¼ oz. duck from Kier No. 2 and Kier No. 3 were given a second boil of five hours and taken out O. K.

From the kier bleach boils listed above may be drawn these general conclusions:

1. Steam injector kiers may be used successfully for peroxide bleach boiling.



2. Fairly strongly alkaline peroxide bleach solutions may be boiled in steel kiers and at the same time made to bleach cotton goods.
3. If a stable enough peroxide is used, the kier boiling liquor should retain much of its bleaching strength for a considerable time, unless this strength is used up in bleaching the cloth.
4. The decrease in the peroxide concentration of the kier liquor should be proportional to the amount of bleaching that has been done, providing the drop in the total alkalinity concentration is correlative.

Technical Notes from Foreign Sources

Discharge—Printing upon Acetate-Silk Dyeings

German Patent No. 461,753—*I. G. Farben-Ind. A.-G.*—Formaldehyde sulphoxylates in the form of their sodium salts do not discharge acetate-silk dyeings, or at best do so unsatisfactorily. The same is true of other commonly-used discharging-agents. Formaldehyde-zinc-sulphoxylates, however, have been found to discharge the type of dyeings in question very satisfactorily, a surprising fact, since the attempt to produce an effective discharge by adding zinc oxide or zinc carbonate to sodium sulphoxylates has been found to be unsuccessful.

The process is carried out normally, i.e., the goods are printed with a suitable discharge paste, steamed, and then finished as usual. Dyestuffs (basics) which are not discharged by the reducing agent in question may also be added, thus making possible other color-effects. A specimen of a suitable discharge paste is as follows: 240 g. of Hyraldite W sol. conc. (a formaldehyde-zinc-sulphoxylate) are well pasted up with 60 g. of glycerol, 100 cc. of water, and 600 g. of gum arabic paste 1—1, the whole warmed at 50°-60° C. for 10-15 minutes, and then stirred until cold. The goods, after printing with this, are somewhat dried, steamed for 2-5 minutes, washed, and dried.

Fast Color—Discharges with Vat Dyestuffs

German Patent No. 461,292—*I. G. Farben-Ind. A.-G.*—The reducing agent chosen is the disulphonic acid (the Ca salt) of dimethylphenyl-benzyl-ammonium chloride (known as Leucotrope W conc.). The dyeings to be discharged are produced from such vat dyestuffs as are affected by suitable reducing agents in combination with this assistant, the dyestuffs which are to be used as the basis for the color-printing are of course those which are not so affected. The advantage of the use of vat dyestuffs entirely over the employment of vat-dyestuffs used over azo-dyeings is, that the ground-color is, of course, as permanent as the printed pattern. The pastes are of about the usual composition, viz.: for 130 g. of an average vat dyestuff, 600 g. of stock paste, 80 g. of Leucotrope W conc., 40 g. of anthraquinone paste, and 150 cc. of water are used. The stock paste consists of 50 g. of zinc oxide, 30 g. of glycerine, 30 g. of Dissolving Salt B, 200 g. of starch-tragacanth thickening, 120 g. of potash, and 150 g. of Hydrosulphite NF conc. (2-1). The goods are then printed, steamed at 101° C. for 5 minutes in absence of air, and then washed and soaped.

Dynamics of Color

Dorias—Monatsoh. f. Textil-Ind. 45, 29 (1930).—*A* short paper dealing with the use of the Ostwald theory of color, in the teaching of color-design.

Enzymatic Removal of Finishing Agents

Dr. Hans Wesenberg—Monatsch. f. Textil-Ind. 45, 34 (1930).—A short paper, commenting upon an earlier one upon the same topic, by Dr. Bundesmann, in the same journal.

Vat Dyestuffs

German Patent No. 445,823; *I. G. Farben-Ind. A. G.*—Beta-hydrogenated propionic acids are reacted with amino-anthraquinones or their derivatives or substitution-products, with or without dilution-agents or such substances as will neutralize the halogen acid set free in the reaction. The alkali salts of the products are suitable for dyeing animal or artificial fibers, such as acetate silk, and can also be used as the basis for synthesis of other more complicated dyestuffs. The same reaction can be carried out by using halogenated anthraquinones and beta-amino-propionic acid. Seven examples are given.

Spinning of Acetate Silk

German Patent No. 460,687; *I. G. Farben-Ind. A. G.*—To the precipitating-bath in which the fiber is spun, the bath containing a "precipitating salt" in solution, is added some substance which is known to be a solvent, or at least a swelling agent, for the ester in question. The patented procedure is intended to obviate the breaking of the fiber, especially, at the point where it passes from the bath into the air. It has been assumed that the fiber would be the firmer, the more completely it was precipitated from the spinning bath; but by the present means the temporary brittleness or low tensile strength of the freshly precipitated fiber is replaced by a temporarily residual softness or plasticity which keeps the fiber from breaking so easily; i.e., the precipitation is prolonged, so to speak, till the fiber has adjusted itself to the permanently solid condition.

Viscose Silk Precipitation

German Patent No. 460,257; *Fr. Kuettner u. Willy Linke in Pirnar.*—Involves the addition of magnesium sulphate to saturation, to the precipitating bath of aqueous sodium bisulphite. The fiber is claimed to acquire a much greater solidity and elasticity by this means. The viscose mass should not be too young. Best temperature for spinning, 40°-50° C.

Unusual Animal Fibers

German Patent No. 456,313; *Dr. A. Ehrenreich u. K. Bendixen.*—A strange source for a textile fiber—the skins of fish of the Plagiostomata (shark, ray, dogfish) and Chondropterygii (sturgeon) groups. The skins, after removal of the fins, spines, and horny plates, are treated with swelling or softening agents, such as a solution of sodium sulphite, whereby the skins are disintegrated and separated by a carding process into separate fibers, which are preserved from putrefying by treatment with some preservative agent. The fibers can be made capable of keeping without putrefaction by treatment (before or after the disintegration) with ordinary preservative substances, or even with extracts of the gastric juice or urine of the fish—a rather unkind method, surely, to make the fish contribute to its own utilization!—The fibers are long, and greatly resemble silk, and can be spun like any other fiber. Those obtained from the shark possess a tensile strength about six times as great as those from oxhide, etc. Weaves produced from them display waterproofing qualities very decidedly.

The process strongly recalls the production of cellulose fiber (pulp-fiber) from wood.

The patent does not mention any possible need of deodorizing the fiber before marketing the woven goods produced from it!

Improving the Scroop of Artificial Silk

German Patent No. 456,886; *Dr. J. C. Hartogs, Arnhem (Holland).*—The improvement claimed is gained by wetting the silk in the form of spun fiber with water or a suitable aqueous solution, and warming to between 50° and 100° C., for a greater or less time. The process may be repeated, if desired, as many times as wished. The process recalls a procedure taken up in German Patent No. 134,312, in which the tensile strength of such fibers, especially in the wet condition, is increased by removing chemically-combined water from the fiber by dehydrating agents. In this latter process the heating is dry, over 100° C., and involves an alteration in the chemical structure of the fiber.

Mordant Dis-Azo Dyestuffs

German Patent No. 456,234; *Durand and Hugenin.*—The first component, a diamine, is p-phenylene-diamine-sulphonic acid. The second components are the hydroxy-acids of the salicylic acid series, and may consist of the same substance, 2 mols, or of two different substances, 1 mol of each. Practically, the p-phenylene-diamine nucleus first exists only theoretically; i.e., it is a substance containing only one free amino group, capable of being diazotized and coupled to the first molecule of the second component, and another group, in the para position, which can then be converted to an amino-group, which is then diazotized and coupled as before. The first example (5 are given) accordingly proceeds from p-nitraniline-sulphonic acid, which is diazotized and coupled to salicylic acid. The mono-azo dyestuff so formed is now reduced with a solution of sodium polysulphide, cold this reducing agent affecting only the nitro-group, and not the azo-linkage. The reduced azo-dyestuff-amino-compound is then diazotized and coupled (the diazo-compound is insoluble) to another molecule of salicylic acid, in this case with the aid of caustic soda (the first coupling will take place with soda-ash as the alkali). The disazo product formed, a yellow brown, crystalline powder, is soluble in water with a reddish-yellow color, which changes to bluish-red with caustic; soluble in conc. sulphuric acid with a violet color. It dyes chromed wool in brownish-orange tones. It can be printed upon cotton, with a chrome mordant, in the same tone, of fairly good fastness. All of the products cited in the examples are brown to yellowish-brown.

Announcement has been made of the merger of the Hussong Dyeing Machine Co., of Groveville, N. J., and Walker and Davis, Inc., of Valetta and Coral Streets, Frankford, Philadelphia, as of March 21, 1930. It is expected that by the first of July the Hussong Dyeing Machine Co. will have been moved to the plant in Philadelphia, where all manufacturing will be done in the future.

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